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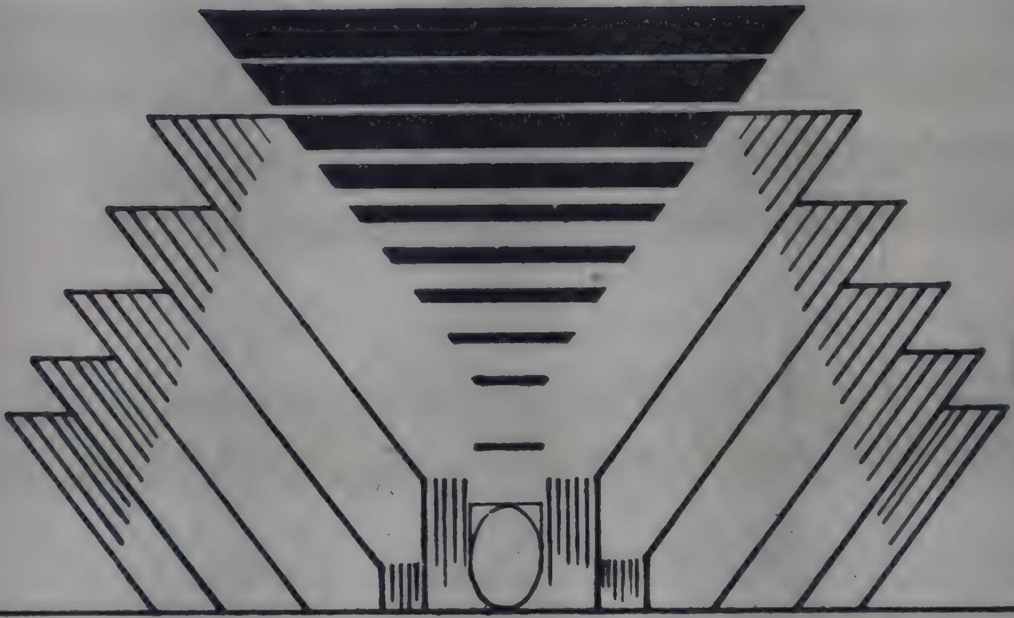

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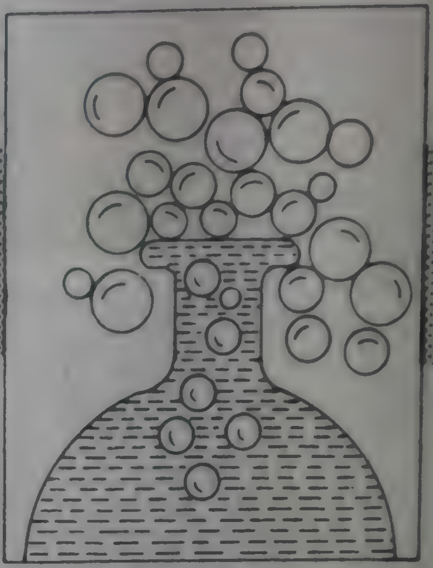

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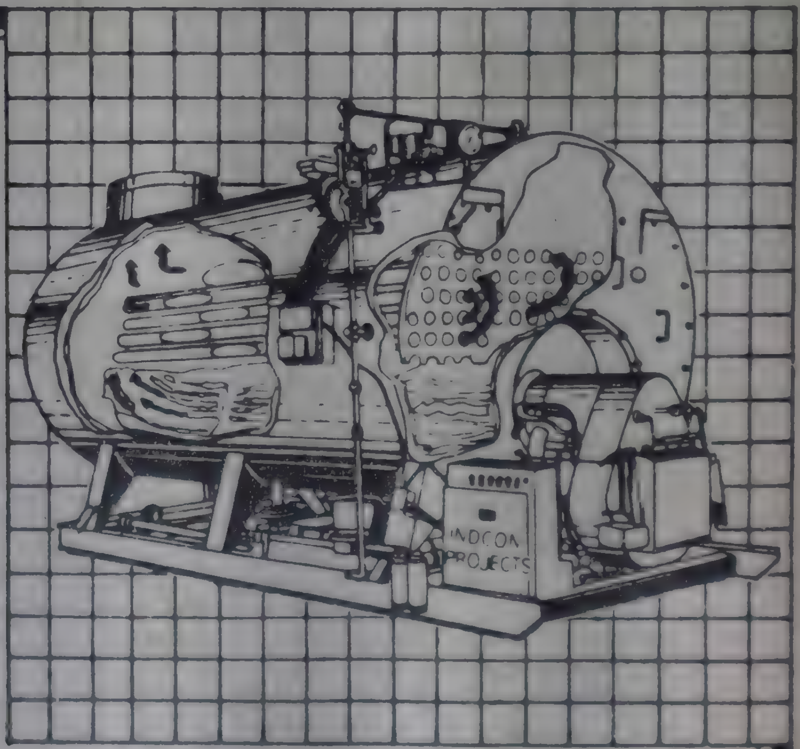

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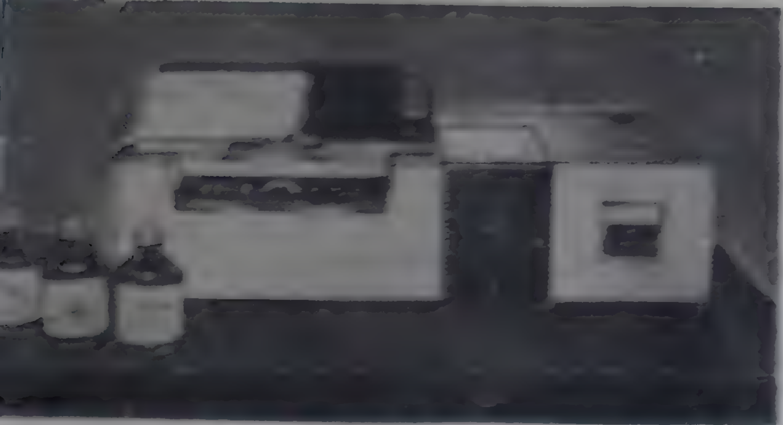

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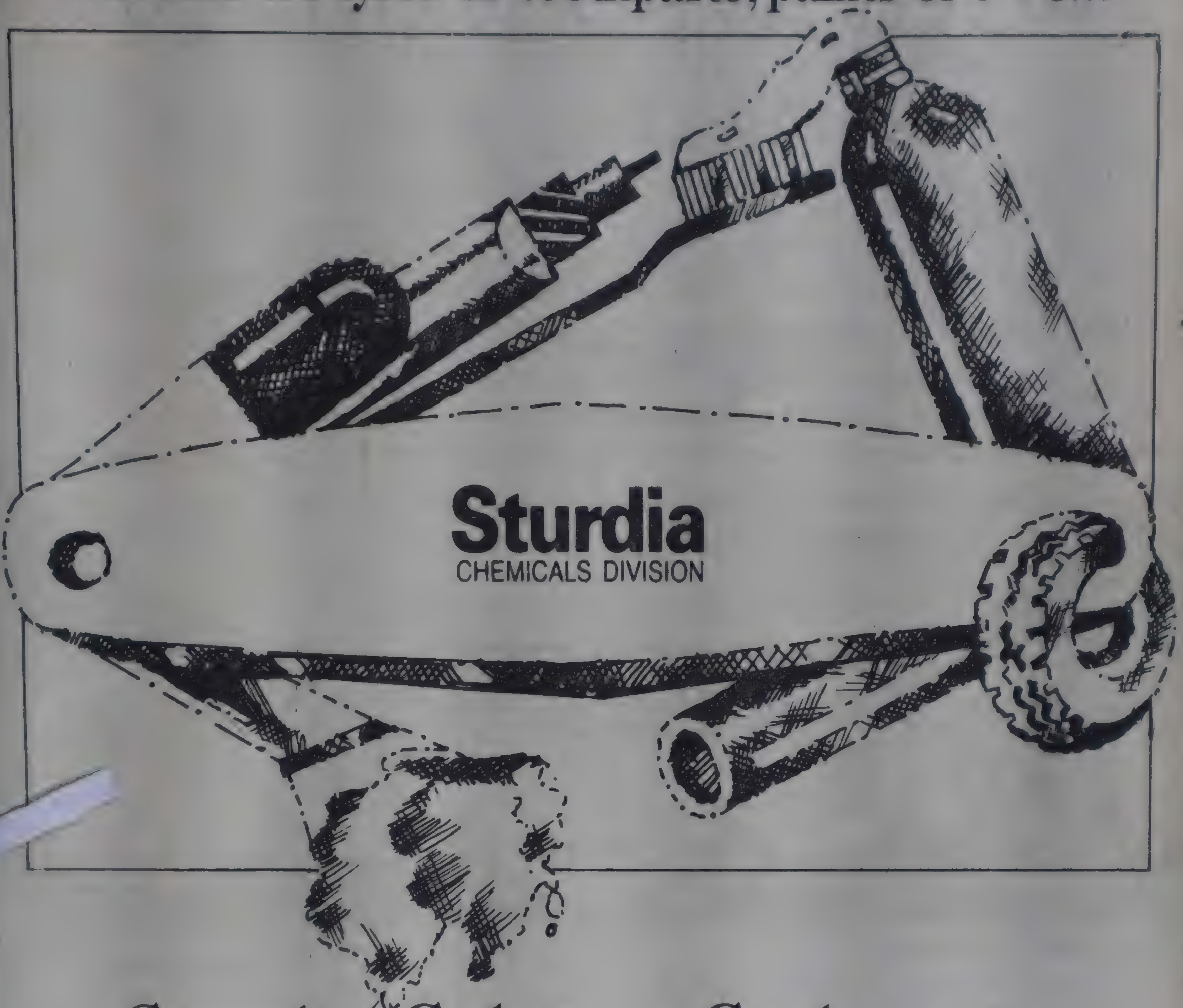

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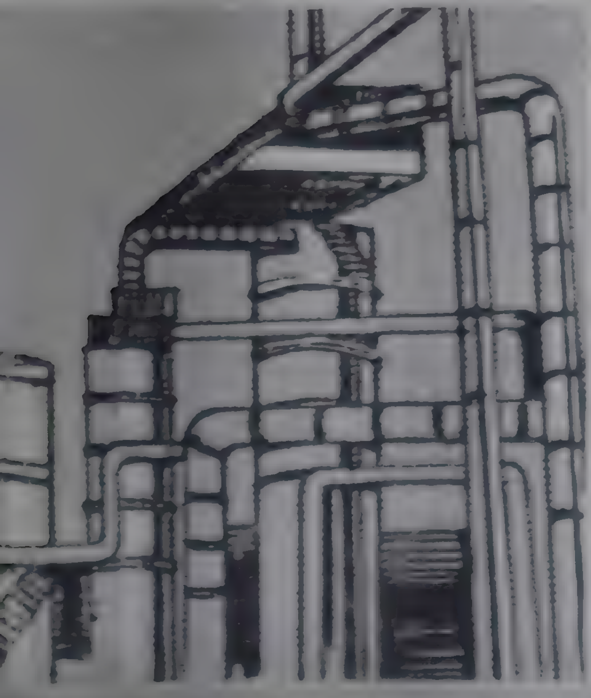

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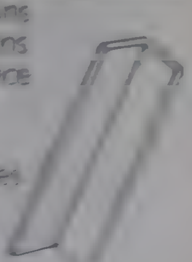

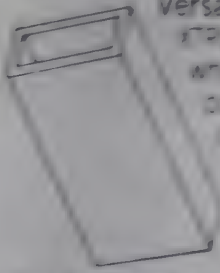

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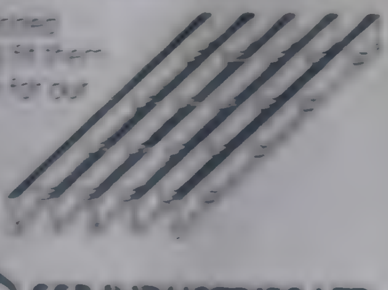

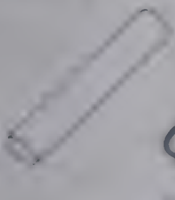

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CHEMICAL
WEEKLY

VOL. XXXIII AUGUST 2, 1988 NO. 47

The National Coal Scenario - II

The R & D Efforts

e Geological Survey of India has assessed the coal reserves s on 1.1.88 at 1,70,460 million tonnes for coal seams of 0.5 thickness and above, up to a depth of 1200 metres. Bihar 33% of the nation's coal reserves, Orissa 23%, West Bengal Madhya Pradesh 16% and Andhra Pradesh 6%.

otal of 4,422 million tonnes (MT) of additional coal reserves been estimated during April to December 1987, out of which MT came under the proved category, 706 MT estimated and under the indicated category. Of the new reserves 865 MT xpected to be amenable for open cast mining. The coal pro- by their very nature are of long gestation. Hence, the action and the consequential investment in the coal sector should ewed in the context of a perspective plan extending well nd the Seventh Plan period, with pointed thrust on the quan- jump of coal/lignite production in successive years.

e working group has estimated the country's requirement of by the end of the Seventh five year plan at 240 MT of raw and 7.59 MT of middling. The requirements at the turn of the tury (2000 AD) has been assessed at 400 MT but, the esti- e by the Planning Commission has tended to be conservative about 20 MT. The share of open cast and underground pro- tion of coal by the end of Seventh plan is expected to be 56:44 against 49:51 in the Sixth plan.

bout 240 MT of coal including double movement of 26 MT quired to be moved by 1989-90 of which the railways are ected to move about 144 MT. For moving the above quantity oal, the Railways will require on an average of 17,000 wagons, ch will involve a tremendous pressure on their carrying capac- As a long term solution a pilot project of transporting coal in y form by pipelines, specially for pithead power stations is being ked out on an experimental basis over a distance of 59 Kms n New Majri mines (WCL) to Chandrapur thermal power sta- of Maharashtra State Electricity Board, during the Seventh plan od for an annual throughput of 0.8 MT. This project has already n cleared by the S.S.R.C. (Standing Scientific Research Com- ee) and a Memorandum of Understanding for the preparation oject report has been signed between Western Coalfields and . If found successful and economically viable, this experiment be extended for designing pipelines over longer distances.

Non-availability of power and frequent power interruptions, espe- cially in Bengal and Bihar areas have been major constraints in coal production in ECL and BCCL. To improve power supply to Bengal-Bihar region three coal based captive power plants of 2 X 10 MW capacity are being set up one each in ECL, BCCL and CCL. As a long term solution to this perennial problem a feasibility study for the installation of a dedicated coal based power station of about 600 MW based on Mukunda open cast project in Jhansi coalfield is being planned.

In the past, production of coal had precedence over all other considerations, not much concern was shown for environmental management. The coal companies have inherited a large scale back log of environmental damage. Large areas of land are required for the development of coal mines which are mostly agricultural and forest lands. Land reclamation after mining thus assumes paramount importance because land required for mining is only an intermediate use and not the end use.

Recognising that mining and associated operations adversely affect environment and ecology, CMPDI prepares Environment Management Plan (EMP), incorporated reclamation plan, solid waste management for each project. Only after the EMP is accepted and environmental clearance is accorded by the Ministry of Environment, forests and wildlife, project reports are sanctioned by the Government. CMPDI have prepared 15 such reports during 1987-88.

Measures for providing adequate environmental safeguards and Sylvicultural regeneration in the Coalfields are priority items of the Department of Coal. Integrated Environmental plans for Talcher, North Karanpara and Singareni Coalfields are already available. All coal companies are required to have a detailed afforestation and reclamation plan. Over 6 million saplings have been planted under this project by all coal companies during the seven month period of April-November, 1987

The development of high capacity open cast mines has necessarily involved the introduction of heavy earth moving machinery in large numbers. Besides there is also a distinct trend towards mechanised long wall methods in underground mining. During the year 1986-87, open cast mine production of Coal India and Sin gareni totalled to 88 MT and underground mines 73 MT. By 1990, the output from open cast mines is expected to touch 125 MT as against only 98 MT from underground mines.

A heartening feature of the trend towards mechanisation is the fillip given to indigenous coal machinery manufacturing industry. The list of indigenous items consist of shovel and dumpers of various capacities, drag lines, long wall face equipment and accessories. Indigenous procurement today accounts for 87%. Many factors have contributed to the close cooperation between the Coal Sector and indigenous coal mining machinery industry. The standardisation of sizes and specification have helped to maintain the operation of heavy earth moving machineries with reduced levels of inventory holdings. The manufacturers have also played a significant role in rehabilitation of equipment which would otherwise have been discarded as unserviceable.

Apart from the project for slurry transport of 0.8 MT of coal per annum referred to earlier, the Government has constituted a Study Group to advise the Government on the technology level of operation and mode of implementation of coal gasification programme. One of the foreign collaborators, Texaco U.S.A., have obtained encouraging results with samples of Indian coals.

With the assistance of Soviet Union, three sites have been selected for studying the feasibility of underground gasification of coal upto 800 M, the ONGC has taken coal gasification programme for deep seated lignite reserves of Gujarat (over 800 M). A major thrust for conservation of coal is being practiced on the basis of scientific investigations and actual field trials. These include:

(i) Development of new methods of mining namely, hydraulic mining for steep and soft coal, wide wall system of mining for extraction under built up areas, knife edge method for the liquidity of large reserve standing on pillars. These have a direct bearing on increasing the percentage of coal that can be extracted in given geo-mining conditions.

(ii) Stowing scheme to find an alternative for Scarce sand for stowing voids.

(iii) Rock Burst/Roof Fall Schemes—to predict rock burst/roof fall in advance by recording seismic events. A seismic laboratory has been set up in Chinakuri collieries and the events are being recorded on tapes round the clock.

(iv) Any system of underground mining requires leaving certain pillars for the protection of surface structures, preventing fires, inundation. A comprehensive programme has been undertaken to arrive at the optimum size of the pillar leading to conservation of coal resources.

(v) Extensive investigations on mine subsidence leading to extraction of more than 7 MT from below surface structures.

(vi) There was a total of 70 fires in Jharia Coalfields of Bihar. Most of these fires occurred prior to 1907. The strategy for dealing with these fires on a planned basis was initiated in 1977. To deal with mine fires, use of inert gas infusion has been successfully demonstrated. A pressure Swing absorptions System has been [illegible] produce 99.9% pure nitrogen, which is superior to CO_2 for dealing with fires. Nitrogen has been tried in som with considerable success.

A long term programme of cooperation in the coal sec 2000 AD has been drawn up with U.S.S.R. Under this prog the Soviets will assist in the development of 15 coal min jects (five open cast and ten underground) from the stage paration of feasibility report to the stage of full impleme U.S.S.R. has also agreed to assist India in the modernis Patherdih washery. A coal preparation Engineering Instit a Mine Construction Design Institute have also been se CMPDI, Ranchi with Soviet assistance.

India has entered into bilateral arrangement with Poland ing of shafts for Satgran and Pootkibalhari project. Poland h expressed its interest in providing tied credit for the Rajas nite cum power project and has shown its willingness fo taking coal mining projects on a turn-key basis.

Assistance from France has been sought for the deve of thick seam underground coal mining projects. Contracts Katras Chora, and GDK 10 projects have been concluded credit of pound 31 million has been granted by the U.K. coal sector projects. The grant is expected to cover U.K. long wall sets for Moonidh, Dhemomam, Churcha and C projects.

The U.K. Government have in addition, agreed to provid arate grant of pound 52 million for the Ghusick undergrou ject proposed to be implemented on a turn-key basis. The Republic of Germany provide tied financing for import o ment and service for the Neyveli Lignite Corporation seco stage I and second thermal power station stage I proje

FRG has also agreed to Finance the feasibility and cons costs of Ramagundam II cost. The other projects in whic has evinced interest include Rajasthan Lignite cum power and deshaling project at Bina. Canada is offering assista the development of Rajmahal open cast mines to a cap 10 MT on a turn-key basis. Australia has identified the P open cast project for bilateral cooperation. The World Ba offered financial help through the International Bank for struction and Development for four major open cast, one ground and one washery to the tune of $ 580 million.

R & D efforts on safety in the mines is an issue of vita tance. The safety situation in the coal mines has been improving since 1973. This trend has been well maintair rate of fatalities per million tonne of output has fallen in 1973 to 1.07 in 1986 and 0.85 in 1987. The correspond for serious injuries per million tonne are 19.49, 3.63 a respectively.

The current trend of output and R & D efforts on the c may not present a picture of spectacular progress but a clo ing of the current scene will convince any fair minded per the industry is consolidating its achievement and has stren its widening base to meet the demands of the future in a s manner.

T.R.S.

HEMARENA

VENKITESWARAN

Antibacterials

ntibacterials to fight infections of all types by micro- anisms are the biggest sector of modern pharma- ticals. The first major drugs to fight infections were Sulphas from Sulfanilamide through to a series of r increasing complexes of acetosulfonyl chloride with ariety of amino compounds-pyridine, diazine, guan- e etc. Then came the antibiotics starting from pen- n made in a crude way during the last years of the cond World War. The antibiotics have proliferated to much larger spectrum of active compounds, some ecific for certain groups of bacteria, some far more ve fighting a broad spectrum of bacterial species; me continued to be made by fermentation or growth selected bacterial or fungal strains followed by recov- y and purification of the active drug; some made by re synthetic organic reactions at a lower cost than the iginal fermentation derived product. Even more impor- nt are the semisynthetics in which the basic skeleton the active molecule is derived by fermentation and en modified by reactions with a variety of compounds confer different sidechains with better activities and nger periods of activity in the blood stream. The pen- illins have expanded into a large group of betalactam ompounds (the active centre) and a similar type of beta- actam with a six membered ring called cephalosporins re also made by expanding the 5 member ring com- ound of penicillin-6 amino penicillanic acid to the 7 mino cephalorsporanic acid by chemical modifications d then introducing different side groups for enhanced tivity. These antibiotics continue to expand with more rmulations. Now a new group of synthetics called qui- olones have made their advent as active antibacteri- is, rivalling the activities of sulfas and antibiotics. What s more relevant, these are for oral use and avoid the ainful injections of antibiotics (though some of these re also available for oral administration). Quinolones ave been hailed as another revolutionary breakthrough modern therapeutics but they have been only recently pproved by FDA for use in U.S.A. after a few years in urope. As was to be expected closely following the riginal quinolone, there have been numerous modifi- ations of the basic molecule and claims of better or ider spectrum of antibacterial activity. Most are said to be free of side reactions. The quinolones are said to block the reproduction of bacteria by blocking the enzyme which release the DNA helix. The first of the quinolones was nalidixic acid made from Ethoxymethylene malonic ester (EMME) and a pyridine compound. Incidentally, EMME is the base for the antimalarial chloroquine. The activity of nalidixic acid was restricted to urinary tract infections but now the improved compounds have a wider coverage.

The advent of quinolones, into the US pharmaceutical market is expected to create inroads into the traditional antibacterials. Two of these now approved are Norfloxacin (Noroxin of Merck) and Ciprofloxacin (Cipro of Miles Laboratories, a division of Bayer). These are expected to take a 10% share of the $ 3 billion antibiotic market in a few years. But, antibiotics producers are equally on their toes with newer products-Ceftadizine is a third generation cephalosporin made by part synthesis from 6 AP Acid by Glaxo. While Ceftadizine is to be injected there are others which can be administered orally. Squibb have a totally new product Azactan (azeotreonam) and Merck have a new combination drug of thienamycin and cilastatin under the name Primaxin. Other earlier antibiotics continue to hold sway due to the confidence of the medical profession. A list of the top anti-infectives in U.S.A. is shown in the Table on next page. (From *Chemical Business* of May, 1988).

The quinolones have brought into sharp focus the question of injectibles and hospitalisation for treatment. The half life of antibiotics have been increased so that the frequency of injection is reduced and hospitalisation for the sake of injection is rare. But the prime cost of the drug is critical. It is reported that Ciprotherapy costs $7 per day as against $63 to 140 for some of the alternative antibiotics. The confidence of the medical profession has to be built up slowly and the directives of Medicare and insurance cover agencies may also be important factors which determine the relative markets of competitive drugs. The next few years may set the trend in market for antiinfectives in U.S.A. and this trend will filter on to other countries.

SOME KEY NEW PLAYERS IN THE ANTI-INFECTIVE BIG LEAGUES*

Trade Name	Type	Maker	Use	Comment
		Division: Injectables for Serious Infections		
Fortaz (ceftazidime)	Third generation cephalosporin	Glaxo, Inc. Research Triangle Park, NC	Gram negative (esp. *Pseudomonas aeruginosa* and positive organisms	Important b trum antibio dered state conventiona therapy. So variety of pr
Tazicef (Ceftazidime)	Third generation cephalosporin	Smith Kline & French Laboratories Philadelphia	Gram negative (esp. *Pseudomonas aeruginosa*) and positive organisms	
Tazidime (Ceftazidime)	Third generation cephalosporin	Eli Lilly & Co. Indianapolis	Gram negative (esp. *Pseudomonas aeruginosa*) and positive organisms	
Azactam (aztreonam)	First synthetic monocyclic beta-lactam	Squibb Corp. Princeton, NJ	Narrow spectrum against gram-negative	Sold as sa expensive therapy for sides
Primaxin (imipenem)	Combination of imipenem thienamycin enhanced with cilastatin	Merck Sharp & Dohme, West Point, PA	Extremely broad spectrum-gram negative and positive, aerobic and anaerobic organisms	Expensive; product the severe infec
		Division: Orals, Usually for Less-Serious Infections		
Cipro (ciprofloxacin)	Quinolone	Miles Pharmaceutical division, Miles Inc. (unit Bayer USA)	Broad-spectrum-gram negative and positive organisms	First of the tion quinolo comparable second-seno orals. Also s injectables
Noroxin (norfloxacin)	Quinolone	Merck Sharp & Dohme, West Pt., PA	Urinary tract infections	Not expecte major hospi
Augmentin (amoxicillin-clavulanate potassium)	Enzyme protected semisynthetic penicillin	Beecham Laboratories, Bristol, TN	Staphlococcal and streptococcal injections	
Bactrim (trimethoprim-sulfamethoxazole)	Pyramidine antibacterial with sulfanilamide derivative	Roche Laboratories div. Hoffman-La Roche, Nutley, NJ	Staphlococcal and streptococcal infections	
Ceclor (cefaclor)	Second generation cephalosporin	Eli Lilly Indianapolis	Broad spectrum-effective against staphlococcus and streptococcus	Advanced, s oral product first-line an cillins, ampi clines, eryth against garde infections
Ceftin (cefuroxime axetil)	Second generation cephalosporin	Glaxo, Inc. Research Triangle Park, NC	Broad spectrum (esp. Branhamella catarrhalis, Haemophilus influenza	
Keflex (cephalexin)	First-generation cephalosporin	Dista (Division Lilly), Indianapolis	Staphlococcal and streptococcal infections	
Septra (trimethoprim-sulfamethoxazole	Pyramidine antibacterial with a sulfanilamide derivative	Burroughs Wellcome Research Triangle Park, NC	Staphlococcal and streptococcal infections	
Macrodantin (nitrofurantoin macrocrystals)	Nitrofuran type synthetic antibacterial	Norwich-Eaton Pharmaceuticals Inc. (unit of P & G) [illegible]	Urinary tract infections	

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DYESTUFF INDUSTRY:

Raw materials shortage may dampen export efforts

A shortage of vital raw materials may hamper the dyestuff industry's efforts to step up exports, despite the highly favourable situation in the international market, industry sources fear.

Several important ingredients which go into dyes and dye intermediates are now in short supply. These include sulphuric acid, oleum, chlorosulphuric acid, nitric acid, benzene, toluene, naphthalene, ethylene chloride, monoethylene glycol, dimethyl sulphate, sodium cyanide and even carbon dioxide.

The shortage has pushed up the prices, affecting the competitiveness of Indian exporters. Ironically, one of the factors contributing to the current shortage is the increasing consumption fuelled by booming exports.

Some of the crucial inputs like zinc, nitrobenzene and nitric acid come from canalised sources or public sector units. Exporters have suggested evolution of some mechanism so that prices of such primary materials could be maintained for three to six months, so that exporters could quote a firm price to their clients abroad.

Mr. H. C. Kharwala, chairman of the dyes panel of Chemexcil, is trying to organise a consortium of exporters in the small sector for bulk imports of concentrated nitric acid, an item in short supply, whose main local producer is Rashtriya Chemicals and Fertilizers Ltd. (RCF).

The spectre of shortage has emerged at a time when exporters' enthusiasm has been dampened by the unexpected reduction in duty drawback from ten to five per cent. While Government officials claim that the reduction is justified by the cost data submitted by the few companies which responded, exporters dispute the claim but admit that only a few big units submitted the data. Small-scale exporters, who have done a [illegible] job, have little experience in compiling such data and the industry should not be penalised for this omission, it is felt.

Dyestuff [illegible] Rs. 215 crores [illegible] able, considering the fact that exports were a meagre Rs. 46 crores in 1985-86, which rose to Rs. 58 crores in 1986-87. Industry leaders are confident that the world market is so favourable that given adequate support, exports could touch the Rs. 500-crore mark. This is because all over the world, production is being rationalised or curtailed because of environmental and safety reasons.

Another attraction is the appreciation of foreign currencies vis-a-vis the rupee. Another advantage is that the industry has idle capacity both in terms of dyestuff and intermediate production, which could profitably be deployed for export production.

The industry's perception is that the Government is being unduly miserly in granting incentives to exporters. This, they feel, is unwarranted as fiscal incentives would be more than offset by the foreign exchange realisation from increased export turnover. When the Government has generously exempted export profits from the tax net, should it curtail the small incentives enjoyed by the industry? One manufacturer dubbed it as an "accountant's approach to export promotion."

The industry now enjoys a 10 to 12 per cent cash assistance. It wants it to be increased to 20 per cent to compensate for the increased burden imposed by various duties and indirect taxes on export-related inputs like sales tax and octroi on raw materials, excise and State duties on electricity, increased shipping costs, port handling charges and the high cost of export marketing. Aggressive exporting countries like Japan and South Korea charge around three per cent interest on export credit, while India charges 9.5 per cent. Exporters feel that this rate is too high.

Dyestuff plants in the country are over three decades old. In order to achieve modernisation and the resulting economies of scale, the industry wants to import plant and equipment like [illegible]

pylene filter presses, autoc
ers and the like. This will
care of the pollution and s
lems, industry sources feel.
quested the Government for
for a one-time duty free impo
equipment.

GOVT. REJECTS TNFAC'S P FOR NEW UNIT

The government has turne
the application of the Tamil N
rine and Allied Chemicals
(TNFAC) for setting up a ne
the manufacture of hydrofl
The company belongs to B
Tisco as co-promoter.

The Rs. 689.90-lakh proje
come up in the existing locat
company in the Sipcot Indust
in Cuddalore, South Arcot d

The proposal envisaged the
ture of 8,250 tpa of hydroflu
of which 5,250 tpa was inte
captive consumption.

The project cost was to be
ugh equity, loans from finan
tutions and banks.

The government took the
that its present policy was no
the manufacture of the applie
based on imported fluorspar
phur. Therefore, the propose
jected.

The company's main activ
concentrated in Cuddalore w
nearly Rs. 20-crore project e
whose main manufacture is a
fluoride and fluorine chemicals
stalled capacity of 7,500 tp
nium flouride). It also has a
plant with installed capacity o
tonnes of sulphuric acid (
4,950 tonnes of oleum) at
factory.

The company's authorised
Rs. five crores and it has tech
laboration with Buss Limited,
Switzerland.

The company recently got
for the manufacture of [illegible]
fluorine based chemicals (1,0
and cryolite (3000 tpa). Bo
projects involved Rs. 162 lak
ed) against the original cost
[illegible] lakhs. The big reduct
project cost, which was approv
Centre, was necessitated by t
sion of HP liquification scheme
the project as originally [illegible]

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Dr. O. P. KHARBANDA

Frankly Speaking

Carbide's Cheap Trick

(Contd. from previous issue)

David Bergman of the Bhopal Action Group (BAG), London, was quick to respond at the conference despite the chairman refusing to allow him the floor. The Guardian quoted him that the ADL report:

- is an attempt to divert investigation away from health, safety and technical issues. . .
- is a 'completely flawed attempt by Union Carbide to escape moral, legal and financial responsibility for the Bhopal disaster'

According to the ADL paper, 'critical facts were being deliberately omitted and distorted. . ' by the eyewitnesses. These 'critical facts' confirmed the 'sabotage theory', hence the UCC/ADL team relied on witnesses 'who were not present at the time' — hoping that they would oblige? These included a tea-boy, who was traced in Nepal, was flown to New Delhi for the interview which proved to be 'more reliable' ! Do you hear an 'echo' of 'What is it that I want to prove'?

What is the cost of Bhopal? Believe it or not, human life has been sought to be valued. Taking me dian figures, the cost of Bhopal exceeds $100 billion, some 10 times the total assets of Union Carbide in early 1985. Responding to this point in May 1988 and also at the Nov 1985 seminar, CHEMICAL INDUSTRY AFTER BHOPAL, for which too, I was the only invitee from India, I stated:

> It is difficult, if not impossible, to estimate the real cost of the Bhopal tragedy. But if Bhopal had happened in USA, God forbid, the company would have ceased to exist.

That the company cannot escape responsibility for Bhopal is clearly hinted by my colleague, Mike Hyde, in the latest issue of his CHEMICAL INSIGHT (Late June 1988):

> whatever the cause, the disaster was man-made, which means that it could have been prevented. Certainly such a hazardous process should not have been vulnerable to the crude form of 'sabotage' alleged by Carbide.

In an earlier issue (early Jan. 1988), Hyde saw Carbide in a 'nowin' position regarding the Bhopal district court's order for an interim comp tion of Rs. 350 Crores ($270 million), and he

> It seems to me that, in adopting a ster tude, Carbide has missed an opportuni playing a positive role in rehabilitating who suffered. . . It should be possible to formula. . . which would enable Carbide cede to the ruling without admitting lity. . . there are occasions when manag need to make moral. . . judgements. . convinced that a magnanimous response be in Carbide's own best interests. . .

ASK/ADL said that as an Indian, he was g agonised by the Bhopal tragedy, but scienti quiry and investigation must not be allowed influenced by personal feelings and sentin How right? This paper by a consultant paid Union Carbide is sure to agonise hundreds o lions all over the world. I cannot help expres feeling, shared by some participants, that th per may 'backfire' on Carbide. Time alone tell, but the whole affair has left a bad tast around, and Carbide may yet regret the 'victory'.

Meanwhile, it is caught up in a major fin crisis of its own creation. The Bhopal traged to a drop in Carbide's stock price, and amid uncertainty and a poor image of Carbide, was a $4.8 billion hostile takeover bid by Corp early 1985. As a defensive measure was a radical 'surgery' in Carbide's opera selling off consumer products business and on a heavy debt in order to buy back its stock. Servicing of this debt has proved to burden far too heavy for the 'lean' but not n sarily efficient Carbide, which has yet to le live within its means. It may yet 'weather' storm as well (although some analysts have ous doubts), but it may do its 'conscience' to unload the 'burden of Bhopal' instead of to 'sabotage' it.

Next fortnight: CARBIDE DIGS ANOTHER FOR ITSELF ! — re 'the storm'.

hree companies licenced to import penicillin-V

sion that appears to have
a section of 6 APA manufac-
Union Government has is-
nces to three drug companies
t of about 126 million metric
MUs) of penicillin-V.

illin-V is one of the main raw
used for producing 6-APA,
rug used for anti-biotic formu-

er raw material which also
used by 6-APA producers' is
in-G. Some 6-APA manufac-
use penicillin-V as the raw ma-
while others use penicillin-G.

ugh the Government stipulates
entage of penicillin-V and peni-
G which has to be procured in-
ously, such policy stipulation for
llin-V becomes meaningless as
are no manufacturers of this raw
al in the country. On the other
there are domestic producers of
illin-G and users of this raw ma-
have to procure it from indigen-
ources upto the stipulated level.

ce indigenous raw material prices
gher than those of imported raw
rials, the 6-APA manufacturers
g imported penicillin-V as raw ma-
l enjoy a cost-wise advantage over
e who can procure only part of
total requirement of penicillin-G
ugh imports.

ccording to the present policy, 6-
manufacturers using penicillin-G
required to lift this raw material in
following ratio: 60 per cent of the
uirement can be imported provided
per cent of the requirement is met
ugh indigenous sources. While us-
of penicillin-G are made to follow
policy, 6-APA producers using
cillin-V are not adhering to this
lated norm

n fact, industry sources say, such
PA producers are being granted im-
licences for penicillin-V without
restriction on lifting of indigenous
erial.

he existing price of 6-APA is bas-
on the weighted average price of
icillin of 40 per cent indigenous
erial (which is priced at Rs. 650
BOU) and 60 per cent imported
erial (currently available at Rs. 275
BOU). This constitutes the cost of
icillin-G in the manufacture of 6-
A

y allowing manufacturers of 6-APA using penicillin-V (whose current import price is Rs. 250 per BOU) to meet their total requirement through imports, the Government is helping these units to earn substantial profits. This is because their cost of production is far below that of those producers who are using penicillin-G, 60 per cent of which is imported and 40 per cent procured indigenously.

Even while issuing licences to three units for import of 126 MMUs of penicillin-V, the Government has asked the companies to open letters of credit on Hindustan Antibiotics Ltd. (HAL) or Indian Drugs and Pharmaceuticals Ltd. (IDPL) for purchase of this raw material, equivalent to 40 per cent of their total requirement.

But since neither HAL nor IDPL are actually manufacturers of penicillin-V, the APA manufacturers would not be required to procure the raw material indigenously. This will enable them to produce 6-APA entirely out of the imported raw material, whose cost is far less than the domestically produced penicillin-G.

Industry sources fear that the Gov ernment may allow these companies t take advantage of this policy lacuna as even earlier one company was gran ted an import licence for penicillin-V The company was supposed to deposi with the Government an amount equi valent to the difference between the cost of imported penicillin-V and indigenous penicillin-V.

The amount had to be deposited with the Government to ensure that the company would not corner the differential as its profit. Also this would have ensured that the manufacturing cost for 6-APA for units using both penicillin-G and penicillin-V would be the same.

However, this amount has not yet been deposited with the Government. Yet, the Government has issued licences for import of penicillin-V to three companies, including the defaulting firm.

Meanwhile, in view of the obvious cost advantage available for 6-APA manufacturers using penicillin-V, one company has switched over to the use of this raw material. It was earlier using penicillin-G and the switch-over is aimed at taking advantage of the Government policy lacunae.

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Rs. 15 Cr. paradip fluoride project in jeopardy

Footdragging by Paradip Phosphates Ltd (PPL) in the matter of installation of facilities for recovery of fluoride has on the one hand created anxiety over pollution in the Paradip area and on the other jeopardised the future of a Rs 15-crore downstream project for manufacture of aluminium fluoride.

It was with a view to tackling the problem of pollution from fluorine from the phosphatic fertiliser plant that IPICOL had promoted as early as 1985 a joint venture with Chimanlal Atmaram Investments (P) Ltd of the Mafatlal Group for utilising fluorine to make aluminium fluoride. Aluminium fluoride is a major raw material for the production of aluminium for the smelter of the National Aluminium Co. Ltd (Nalco) at Angul in Dhenkanal district. Nilachal Fluorides and Chemicals Ltd. the joint venture project promoted to establish a 3,500 tonne-capacity unit at Paradip, has also been allotted 75 acres of land at Paradip and obtained clearance from pollution control authorities and financial institutions.

At the rate of 20 kg of aluminium fluoride per tonne of aluminium production, the 2.18-lakh-tonne smelter of Nalco would require at full capacity 4,500 tonnes of fluoride per year, and Nilachal Fluorides (NFCL) would thus, have had a ready market. Though originally scheduled to be commissioned by this year end, NFCL has yet to get off the ground because of the failure of PPL to instal facilities estimated to cost Rs. one crore for supply of fluorine to NFCL.

PPL, which is a 51:49 joint venture between the Government of India and the Government of the Republic of Nauru, commissioned its 2,400 TPD diammonium phosphate (DAP) plant at Paradip in March, 1986. In the second phase of the Rs 450 crores project, a 750 TPD phosphoric acid plant, a 2,000 TPD sulphuric acid unit and a 32 mw captive power station are to be set up. The phosphoric acid unit is being installed and is expected to be commissioned by this year-end.

Though the first phase of PPL has had no pollution problem because of the "negative water balance" in normal operating conditions, effluents will pose a problem with the starting of [illegible] units. Since the effluents of [illegible] the Orissa State [illegible] specially stringent restrictions on fluoride level in the creek water at one p.p.m. (parts per million) as against 1.5 p.p.m. recommended by the Central Pollution Control Board. PPL has also been asked to regularly analyse water of the creek for pollutants from phosphorus, ammonia, nitrogen and fluoride.

PPL had agreed "in principle" in 1985 to supply fluorine in the form of fluorosilicic acid to Nilachal Fluorides and reiterated its intention in writing to IPICOL in June 1986 even as it (PPL) was negotiating with the Jacob Engineering Group of Florida, U.S., for procurement of the phosphoric acid plant. It has, however, kept mum on the issue since then, stalling totally any progress on setting up of the fluorides project.

IPICOL is even understood to have offered to advance to PPL 50 per cent of the cost of installing fluorine recovery facility. However, this has apparently not helped matters, leading to speculation that PPL is going back on its original commitment, because of funds constraints or because of its inability to convince its foreign collaborator.

Sources, however, point out that the industrial policy guidelines (1981) of the Union government specifically stated that efforts should be made to recover hydro-fluorosilicic acid from large fertiliser plants and to utilise this byproduct, so as to reduce imports of acid-grade fluorspar as also to minimise pollution. Orissa has been identified as one of the states where the level of fluoride pollution of water is on the high side. Several manufacturers of phosphatic fertilisers elsewhere, like SPIC and Rashtriya Chemicals, have been putting up recovery plants, which also increase their financial viability.

Experts who have studied the effluent discharge plants of PPL, including closed circuiting water pond, washing of gypsum and digging of gypsum ponds, have commented that the system is not fool-proof and that it leaves scope for fluorine contamination through evaporation or percolation. Meanwhile, because of the failure to put up the required fluorine recovery facilities at the time of installation of the phosphoric acid plant now nearing completion, it will entail much higher [illegible] However, IPICOL is still pursuing th matter so that the Rs. 15-crore fluoride venture is able to come up as a downstream unit of PPL and supplier t Nalco.

ROCKET FUEL PLANT IN AP LAUNCHED

India has entered a new era of sel reliance in the manufacture of rocke fuels used in space research, with th launching of a commercial plant wi the assistance of Indian Space Researc Organisation (ISRO) by the Vice-Pres dent, Dr. Shankar Dayal Sharma, this rich coastal Andhra town c 24th July.

While the technology for the man facture of the liquid propellants ha hitherto been confined to the US, th USSR and France for several natio for their space programmes, the ind genous manufacture of the fuels ha become more vital in view of the r cent sevennation embargo on all mi sile related items.

With ISRO making rapid strides developing the know-how process, t prestigeous Andhra Sugars Ltd whi had the necessary infrastructure a technology base, had now erected plant with trial runs proving successf.

The liquid propellants unsymmetric dimethyl hydrazine (UDMH) and m no methyl hydrazine (MMH) now be manufactured in this plant on a co mercial scale would be used in spa applications, defence sciences, pho graphy and agriculture. These t fuels would be utilised in ISRO's s cond and fourth stages, respectively the polar satellite launch vehic (PSLV) programme next year

---

ALUMINIUM IMPORT DECANALISED

The import of aluminium includ aluminium rods will be allowed actual users (industrial) and export t ding houses.

Till now their import was canal through the Minerals and Metals Tra ing Corporation of India.

Import of polyethylene resin/moul ing powder granules (all grades), po styrene resin granules/moulding po der and PVC resins will be allowed be imported by all persons for actu use/stock and sale. Till now the were allowed to be imported by ac

LAB units seek export sops

ting inventories have prodded lkyl benzeno (LAB) producers export incentives to tap the in- nal market.

nst a projected demand of aro- 5,000 tonnes for the year, the tion, along with the opening total about 170,000 tonnes, ing to industry estimates. The local manufacturers, Tamilnadu products Ltd. (TPL), Indian Petro- icals Corporation Ltd. (IPCL) and nce Industries Ltd. (RIL) are tedly holding inventories to the of 8,000 tonnes, 6,000 tonnes and 00 tonnes, respectively according source.

he current glut in the market is buted partly to the presence of -imported material during the early ths of the year. STC, it is said, orted 20,000 tonnes more than what suggested by the Import Advisory mmittee. Drought also dried up rkets in many parts of the country. LAB is quoted in the international rket at around $650 per tonne. Ma- facturers have represented to the mmerce Ministry for 20 per cent sh compensatory support (CCS) thout which not even variable costs n be recovered.

According to industry sources, some ell-known European and American onsumer conglomerates have shown terest in buying LAB from India. ther potential candidates are deter- ent manufacturers in West Asia and he Far East. Only a year ago, India sed to import as much as 80,000 ton- es.

A more fundamental reason for cul- vating the export market is in the fear at the lion's share of the market ill be lost to the domestic producers and when Hindustan Lever and Nir- a implement their plans to put up eir own LAB plants. The two together onsume more than 70 per cent of the ountry's LAB production.

The two detergent giants' plans ave perturbed the LAB producers s well as small-scale soap manufactu- rs who fear that Lever and Nirma will se the integration provision to branch nto their areas of operation. Lever nd Nirma projects, it is feared, will ot only close the doors to the largest arket, but their surplus will further hoke the flooded market

Some people fault plans for new projects on other counts. Nirma, for example, plans to put up its plant in Visakhapatnam, using N-paraffin to be provided by Hindustan Petroleum's proposed plant. Nirma will have to transport the produce to distant Ahmedabad for captive use. Similarly, Hindustan Lever will have to move LAB from Karnal in the North to its Bombay and other factories.

The working group of the Department of Chemicals and Petrochemicals has esttimated the Seventh Plan demand for LAB at 2 lakh tonnes by 1994. TPL had requested the Government ealier that the existing three units can take care of the demand for this period and that new units should be set up only after 1994.

It had argued that if licences are issued to captive consumers, it will create an imbalance, forcing the existing units to curtail production. As the Government appears to be in favour of Lever and Nirma applications, the three existing producers are working hard at penetrating the exoort market. The Department of Chemicals and Petrochemicals is said to have favoured the strategy and recommended export incentive.

PERSONALITIES:

R. K. PAMAN

Mr. R. K. Raman, Managing Director of Madras Industrial Linings Ltd., Madras, has been appointed President of All India Rubber Industries Association.

N. L. SHAH

Mr. Narendra L. Shah of Shah Engineering Works, Bombay, has takan charge as President of Association of Merchants & Manufacturers of Textile Stores & Machinery (India).

Mr. PRADEEP DAVE

Mr. Pradeep P. Dave has been elected as President of the Pesticides Formulators Association of India for the year 1988-89. Mr. Mahendra Desai is the new vice president and Mr. Girish Chowksi became the secretary. They were elected at the annual general meeting held at Bombay on 8th July 1988.

P. RAMAKRISHNAN

Mr. P. Ramakrishnan has been appointed director — marketing of Hindustan Petroleum Corporation Ltd. Prior to this, he was general manager — engineering and projects at the headquarters office. Mr. Ramakrishnan brings to his new position, rich and varied experience in the marketing and distribution operations spread over a period of 28 years of service in the corporation.

INPUT-OUTPUT NORMS FOR 354 MORE ITEMS

The Union Government has evolved standard input-output norms for 354 more export products, for which raw materials could be imported duty-free under the advance licensing scheme.

With this, the number of export products, for which input-output norms have been evolved by the Commerce Ministry, goes up to 503. In the import-export policy for 1988-91, the list was increased to 149 from 100 given in the previous policy for 1985-88.

Of the 354 new items' input-output norms, included in appendix 13-C, as many as 318 items belong to the chemicals and allied sector, 18 to the plastics industry and nine each to the engineering industry and the textiles sector, including readymade garments.

Under the advance import licensing scheme, specified raw materials are allowed to be imported without payment of customs duty, provided the licence holder undertakes a suitable obligation to export the items manufactured out of the imported raw materials with a minimum value addition of 33 per cent. The scheme was designed to help exporters have access to raw materials needed for export production at internationally competitive prices.

One of the constraints faced in the grant of licences under the scheme was identified by the Commerce Ministry as the determination of input-output norms setting forth the quantity-wise requirement of different raw materials for manufacture of the ultimate export product. This exercise involved consultations with technical authorities causing delays.

Already, powers for issue of advance licences have been delegated to regional licensing authorities in cases where input-output norms have been established.

PTFE import norms not to be tightened

In what is being interpreted as a volte face, the Union Government has decided against tightening of import norms for polytetrafluoroethylene (PTFE), a superior variety of engineering plastics having potential for wide ranging uses in many sectors, says a report appearing in The Financial Express.

The volte face means that PTFE would not be shifted from the open general licence to Appendix-3, which contains list of limited permissible items. Earlier, the Department of Chemicals and Petrochemicals had recommended stricter import norms for PTFE by shifting it to Appendix-3. Even the internal committee of the Office of the Chief Controller of Import and Export had agreed to the Department's suggestion.

However, a more detailed examination of the proposal by the Commerce Ministry and the Finance Ministry led to a review of the matter. Both the ministries are now of the view that import norms for PTFE should not be tightened as the production by the only indigenous producer of this item has not stabilised, and even if it has stabilised, the existing import duty on the item is high enough to give the domestic producers adequate protection against cheap imports.

Apparently, the Finance and Commerce Ministries have been persuaded by the Gujarat-based small-scale plastic manufacturers, who use PTFE as the main raw material for producing a variety of high-grade plastic materials for sophisticated and high-tech use. These processors were concerned at the Government plan to tighten the import norms for PTFE, as this would have meant their total dependence on the only domestic producer of this item, Hindustan Fluorocarbons Limited (HFL), a joint sector project promoted by the State-owned Hindustan Organic Chemicals (HOC) and the Andhra Pradesh Government with equity participation from the public.

These processors are of the view that the PTFE grades produced by HFL are not only inadequate, but even their prices are high and quality suspect. They thus feared that any restriction on imports of PTFE by removing it from OGL would adversely affect their production and viability of their operation.

The Department of Chemicals and [illegible] in what the processors have stated in their representation. It has asked the company to improve its production efficiency to reduce the prices of its products to reasonable levels. The claim of HFL of producing eleven grades of PTFE would also be tested by the Government.

This will satisfy the processor, who have alleged in their representation that the quality of all the 11 grades produced by HFL were not of accepted quality as per international standards. These processors require about 20 grades of PTFE, of which only 11 are being produced by HFL.

At the same time, the Department would help HFL to market the PTFE produced at its Rudraram plant which is 44 km away from Hyderabad. The marketing assistance of the State-owned Indian Petrochemicals Corporation Limited (IPCL) and use of its distribution centres located all over the country are being sought by the Department in this connection. The idea is to let the PTFE produced by HFL be marketed by IPCL under some arrangement.

The Government decision to drop the plan for tightening import norms for PTFE also means that the proposal to invoke provisions of the anti-dumping law would also be given a quiet burial by the Department of Chemicals and Petrochemicals. The Commerce and Finance Ministries are understood to have argued that the June 16, 1988 decision to raise the import duty on PTFE from 165 per cent to 195 per cent ad valorem is adequate to ward off any threat of dumping by foreign companies. As such there is no need for invoking the provisions of the anti-dumping law.

The Department of Chemicals and Petrochemicals was planning to remove PTFE from OGL on the allegation made by HFL that large-scale dumping of PTFE by foreign companies had created marketing problems for them as they had just entered the market with a 500 tonne per annum plant. The country's annual requirement of PTFE now is estimated at 300 tonnes, which is expected to go up as its application increases.

The Gujarat-based processors are of the view that there was no dumping by the foreign companies. Moreover, it was not feasible for the foreign plants like Du Pont, Daikin, Monsanto and ICI to dump PTFE here as they were supplying this to these processors here in times.

The processors had wanted import duty on PTFE shou ced to 150 per cent and should duty be raised fur the present 195 per cent. Be ing quality problems of HF PTFE, the processors had the price of these raw mate 30 per cent more than the of imported PTFE.

RIL VENTURE FOR BUTYL

Reliance Industries Ltd, to set up a 30,000 tpa plant ce butyl rubber as part of its mical complex at Hazira, Gu will, thus, be the first to it in this part of the world.

According to sources in t cal industry, Reliance Petro PVC and MEG projects repre bottom of an iceberg, so to group is quietly planning dive into a wide range of petro using various streams from cr Butyl rubber, for example, wi from butylene.

An estimated 10,000 tonn material is being imported half-a-dozen units engaged in nufacture of tyre tubes. Buty virtue is that it does not all leak out thereby preventing becoming soft and succumbing tures. Such tubes enable tyre longer.

Small amounts of butyl ru consumed by the pharmaceut stry too.

In the past, efforts to ma butyl rubber within the countr not succeed. For one thing, mand here was not attractive to put up an economically vi Another reason was the reluc Exxon of the US and Polysar to part with the know-how.

The Soviet Union was w share the technology and a Vis nam-based party even secured of intent, which was not However, the demand for the is increasing as more units ing up to manufacture buty tubes.

Interestingly, RIL has ap MRTPC clearance for the ru ject under its own banner, a the name of Reliance Petro Ltd. The application mentions of the project as Rs. 240 cr

Finolex to make PVC

bles has received appro-
Cabinet Committee on Eco-
s for the manufacture of
nnes of PVC a year at Jai-
harashtra. There are reliable
the Hindujas were lobbying
overnment for granting this
, the Chhabrias of Finolex
to be confused with 'take-
ras). Incidentally, the Ch-
re related to the Hindujas.
ously, IPCL's Maharashtra
ker Complex (MGCC) has
e Government for allowing it
the capacity of its cracker
from 3,30,000 tonnes to
tonnes a year. According to
application, this would enable
a world scale sized cracker
Experts agree with this claim
MGCC. However another rea-
ind MGCC's application could
Finolex Cables would require
45,000 tonnes of ethylene a
order to make PVC.
ex Cables would also need ano-
,000 tonnes of vinyl chloride
er (VCM) to make PVC. How-
ere is no supplier of VCM anywhere in the vicinity of Jaigadh. Could it be, ask informed sources, that the Chhabrias will be allowed to import the VCM, which they could then use with ethylene to make PVC? Could it also be that the Hindujas might be willing to supply this VCM to the Chhabrias, considering that the Hindujas have been major traders of petrochemical products in the world market.

In fact, the Hindujas recently acquired the trading rights of the Gulf Oil Trading Company (GOTCO) for most parts of the world, and they even own a petrochemical complex/refinery in Taiwan. Could the imports of VCM for the Chhabrias come from there.

In any case, the Chhabrias are bound to benefit from the setting up of this project, estimated to cost around Rs. 120 crores. This is because they themselves would require around 30,000 tonnes of PVC every year for their cables operations. The remaining could easily be sold in the Indian market.

Significantly, MGCC had earlier applied to the Government for permission to manufacture 1,00,000 tonnes of HDPE annually from the enhanced production of ethylene, once the cracker's capacity is enhanced. This is because the swing capacity for manufacturing HDPE at MGCC's complex at present is not suitable for producing a wide range of HDPE grades suitable for all end users of HDPE in India. Such a facility exists with Polyolefins India Ltd (PIL). Now it appears that MGCC will not be allowed to manufacture additional HDPE.

It is, however, not yet clear who will receive the remaining 55,000 tonnes of ethylene that MGCC is likely to produce additionally every year. At present the contenders for this ethylene are reported to be PIL, Narendra Bhuva of Indo Nissan and IPCL. PIL would like to receive the ethylene for increasing its HDPE manufacturing capacity, which it has not been able to do as the expansion clearances in respect of NOCIL (its feedstock supplier) are still pending with the Government for a long time. Mr. Bhuva needs the ethylene for expanding the activities of his own company. IPCL desires to use the ethylene for manufacturing downstream products like ethylene glycol and polyethylene. Who will eventually get this ethylene is anybody's guess.

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MANIPULATING ALCOHOL PRICES :

MRTPC pulls up manufacturer s

The Monopolies and Restrictive Trade Practices Commission (MRTPC) has hauled up the manufacturers of industrial alcohol for manipulating prices and flouting the statutory price control order.

In an ex-parte interim injunction order, the MRTPC has restrained Yeast Alcohol Enzyme Ltd, Cellulose Products of India Ltd and Guj-Chem Distilleries India Ltd — all members of the all-Gujarat Distillery Association — from indulging in restrictive trade practices of manipulating prices and has asked them to show-cause why the injunction be not made absolute. The commission has also ordered a comprehensive enquiry into charges against the distilleries that they have been overcharging in agreement with one another.

Industrial alcohol is covered as an essential commodity under the provisions of the Industrial Development and Regulations Act 1951 and under Section 18-G of this Act, the Union government has promulgated a price control order known as Ethyl Alcohol Price (Control) Order, 1971. Thus the price of industrial alcohol is determined under the order from time of time.

The price is however, allowed to be varied by the state governments on the basis of variations in transport cost and levies and fee applicable in the state. In fact, under clause (IV) of Ethyl Alcohol Price (Control) Order, the state government is ' empowered to determine the price of ethyl alcohol as produced by each distillery within the guidance and framework of the order.

The Union government had last revised the prices on September 29, 1987 and fixed it at Rs. 2.30 per litre with effect from October 1, 1987. The director of prohibition, Gujarat had accordingly determined the prices for individual distilleries in the state from Rs. 2.16 to Rs. 2.83 per litre.

The Commission passed the order on the basis of an application filed by the director-general of investig and registration in company affai partment, who had received a plaint from the Gujarat alcohol-b industries development associatio

The user-industries association charged that the all-Gujarat dist association and its members have tered into an "agreement" and an "exorbitant" price of Rs. 3.7 litre of industrial alcohol and th indulged in restrictive trade pra falling in clause (d) of Sec 33 o MRTP Act.

It was also alleged that by ent into an agreement the inter-se co tition among members of the dist association has been prevented restricted and any such trade pra falls under clause (J) of Sec 33 c Act.

Moreover, the director of prohi and excise, Ahmedabad, in pursu of powers conferred on him u Ethyl Alcohol Price (Control) O has fixed the final price to be cha for supply of the material by each tillery. It was alleged that the ass tion and its member distilleries sharing price much in excess of statutory price and thereby ca

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costs on consumers of in- lcohol.

, also pointed out that ethyl consumers are compelled to undertaking to the distilleries upplies are made to the effec. price of Rs. 3.77 per litre is greed upon to by them "volun- nd willingly."

commission has observed in its that the statement that the will- s of consuming units is volun- nd mutually agreed upon without ressure "runs against human na- No consumer would like to pay er price willingly.

e Commission has noted that do- ntary evidence brought before it es out a 'strong prima facie case st the distilleries for having char- prices in excess of prices fixed by government. The willingness of suming units to pay higher prices ears to have been obtained under ss and in any case does not pro- any justification for charging high- prices.

'We are however, not convinced to degree of certitude necessary for nt of interim injunction as far as egation of concerted action on the rt of all the respondents in charging gher prices to ethyl alcohol is con- rned. That some members have arged more or less the same price oes point to the probability of invol- ement of the all-Gujarat distillery as- ociation, but the matter does not go eyond the realm of probability as ings stand today. The position ay crystallise at a later stage f regular inquiry ordered to be insti- ted against the respondents (distill- ries)," the commission has said.

ECHNIQUE TO GET INDUSTRIAL LCOHOL FROM TAPIOCA

Tuber crop scientists have develop- d an effective technology for produc- ng industrial alcohol from tapioca.

The technology, by which it is pos- sible to produce 400 to 420 litres of thanol from one tonne of dried tapio- a chips, has now been patented.

Scientists of the Central Tuber Crops Research Institute (CTCRI) at Trivandrum have evolved the processes for multiple use of tapioca also known as Cassava and grown mainly in poor and marginal soils.

The institute, under the Indian Council of Agricultural Research (ICAR), is working on improving tropical tuber crops like tapioca, sweet potato, edible yams, aroids and minor tubers to enhance production and farm income. It is now celebrating its silver jubilee.

In the last 25 years of research, the institute has developed 18 new varieties of tuber crops with higher yields and other desirable traits which have been released for general cultivation.

The agro-techniques and plant protection methods for these crops have been standardised.

Of the new varieties, nine were released at the silver jubilee inaugural function last week.

In post-harvest technology research, the institute has developed a simple method to prolong by two months the shelf-life of fresh tapioca tubers. Normally the shelf-life of tapioca tubers is limited.

Scientists of the institute have also developed a hand-operated chipping machine which is three times more efficient than the conventional slicing.

CALL FOR INTEGRATED ENERGY PLAN

The Institute of Economic Studies has called for an integrated energy plan with focus on use of energy.

There would be a peak power shortage of 11,000 MW in the eighth plan period even with all the envisaged induction of new power generation, Mr Kulbir Singh, executive director of the IES said in a note submitted to the Union government.

Mr Singh emphasised the need for sectoral linkages of coal railways and power, irrespective of the ownership, in order to upgrade total power output in a framework that optimised allocation of physical, financial, entrepreneurial and managerial resources.

He called for a thorough revamping of state electricity boards.

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o invest Rs. 1000 Cr. in new projects

es well, Southern Petroche- rporation Ltd (SPIC) should n its way to invest around 0 crores in three major ven- g the next three years.

ing to information available, ikely to get the formal clear- setting up the aromatics com- he Madras Refineries. If SPIC , it should mean a big loss for lujas, who are also reported en on setting up this complex, d to involve an investment of . 800 crores. The clearance is d in a few months time.

ltaneously, SPIC is also setting Rs. 60-crore project as part of anali petrochemical complex. oject is being set up for the cture of propylene, propylene glycol and polyol and is expec- account for annual sales of Rs. 50 crores once it goes on by mid-1990s. Currently, nego- s are reported to be going on nancial institutions.

C has also applied to the Govern- for getting clearance for manufacturing penicillin-G from the basic stage itself. Already SPIC has the necessary letters of intent from the Government for manufacturing 6 APA, 7 ADCA and rifampicin. Once SPIC gets the clearance for manufacturing penicillin-G, it hopes to set up an integrated pharmaceutical manufacturing division which is estimated to cost around Rs. 50 crores.

The SPIC management has, however, clarified that it is not interested in bidding for setting up the Visakhapatnam petrochemical complex, which is estimated to cost around Rs. 2,000 crores. Current indications are that IPCL is to be given permission to set up this project in collaboration with Mitsui Corporation of Japan, with both having a join equity holding, in the same way as in the case of Maruti Udyog Ltd. However, other names mentioned but not yet confirmed who are also interested in setting up this petrochemical complex are the Birlas and the Mallyas.

According to a senior management member of SPIC, the company was asked by the Andhra Pradesh Government if it would be interested in setting up such a project. The company said that it was not. The offer was made when SPIC enquired if it could get ethylene from the petrochemical complex for the manufacture of 50,000 tonnes of HDPE and 50,000 tonnes of PVC a year.

Earlier, the company had made an application to the Union Government (the application is still pending) to allow it to import ethylene for the manufacture of HDPE/PVC. The company claimed that since it already had facilities for the import of ammonia (a raw material used in producing fertilisers which the company manufactures), it should also be allowed to import ethylene for which the company could set up a terminal at Tuticorin or at Madras.

The Government had reportedly turned down SPIC's request for importing ethylene. But, if SPIC can get ethylene from the Visakhapatnam petrochemical complex, it would be keen on setting up a HDPE/PVC manufacturing unit, the company spokesman said.

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Quest for cheaper and cleaner coal

Growing environmental concern about the pollution caused by traditional coal-fired power stations and uncertainty about the long-term future of nuclear power have prompted an upsurge of international interest in new "clean coal" technologies.

Britain's main experimental plant for advanced coal technology, at Grimethorpe in South Yorkshire, is threatened with closure because the CEGB (Government and Central Electricity Generating Board) has decided not to renew a three-year agreement with British Coal to share research costs. British Coal says that it can only contribute part of the £35 millions required to continue work at Grimethorpe and has asked the Energy Department to help with the rest.

British Coal officials argue that the UK Government spends far less than other Western governments on coal research and development — only 5p per tonne of coal used for power generation, compared with the US Government's 31p per tonne, West Germany's 34p per tonne and Japan's 105p per tonne.

For its part, the CEGB says it cannot justify spending more money on Grimethrope because the process being developed would work well only in relatively small power stations — up to about 300 megawatts (MW). It says it can give UK electricity consumers better value for money by going for economies of scale and building large conventional plants with 900 MW turbine generators, even though these will require expensive "flue gas desulphurisation" (FGD) equipment to reduce sulphur dioxide emissions, one of the main causes of acid rain. FGD plant is expected to add 15 per cent to the cost of the CEGB's next generation of coal-fired stations.

British advocates of advanced coal technology are pinning their hopes on the impending privatisation and break-up of the CEGB. Under the Government's plans, private companies will be encouraged to build power stations — most of which are likely to be small and so suitable for innovative generating systems.

In a traditional coal-fired power station, a mixture of air and coal powder burns in the combustion chamber. Sulphur dioxide has to be removed afterwards by passing the exhaust gases through an FGD plant, although emissions of nitrogen oxides (NOx), the other main contributor to acid rain, can be reduced by altering combustion conditions. The CEGB is spending £170 millions on "low NOx burners" for its coal-fired power stations.

The new technologies remove both sulphur and nitrogen pollutants during combustion. They convert coal energy into electricity more efficiently than a conventional power station by using two turbines, one driven by steam and the other by gas, in a "co cycle".

Although several advanced te gy generating systems are being loped in different parts of the they fall into two categories: flu bed combustion (FBC) and inte gasification combined cycle (IGC

Fluidised bed combustion is burning crushed coal in a bed o particles, such as ash, sand or po ed limestone. An upward flow keeps the bed in constant motion bling like a boiling kettle. An power plant has one turbine driv steam produced in boiler tubes i sed in the fluidised bed, and a s driven by the hot exhaust gases

FBC systems have two imm advantages. The first is that the burn a wide variety of materials ding rocks so low in coal that shows as black flecks in the sur ing stone. The second is po control. Because the FBC comb temperature is lower than in a co tional burner, less NOx is formed cium-containing minerals (lime or dolomite) in the bed trap an phur in the burning fuel to form calcium sulphate, emissions of su dioxide gas can be reduced by than 90 per cent.

The type of FBC with the best record of power generation is k as circulating fluidised bed cor tion (CFBC). In this process th flows so fast that the bed loses clearly defined surface and sw

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rticles fills the combustion

rtant variant of FBC —
fluidised combustion or
has received considerable
t support, without so for
as mucn success as CFBC.
eature is that the entire combustion chamber operates at a pressure between five and 20 atmospheres. This means that the plant occupies much less space (and should therefore be less expensive to build) than FBC at normal atmospheric pressure, and that the exhaust gases can be expanded more effectively through a gas turbine.

CFCs could alter heat balance

mount of extra ultraviolet
ching the surface of the Earth
the ozone "hole" over Antarc-
ot large, but researchers are
that the dynamics of the at-
re is likely to be much more
by the build-up of trace gases,
chlorine.

rine is released when chloroflu-
ons — CFCs — are broken
by solar ultraviolet radiation in
atosphere. In most of the strato-
, for most of the time, chlorine
red in compounds such as chlo-
itrate, and is not immediately
ble to attack ozone. But in the
air high over Antarctica in win-
icy particles containing nit-
d freeze out, and chlorine is re-
in an active form.

servations in Antarctica show
ClO, an oxide of chlorine is pre-
in large enough quantities in the
osphere each spring to provide
he chlorine necessary to cause the
rved depletion of ozone. Such
ysis is helpful for an understanding of the springtime hole in the ozone layer over Antarctica.

Even if the production of CFCs remains limited by the terms of the Montreal agreement, signed in September 1987, the abundance of active chlorine in the stratosphere will increase from 2 parts per billion (ppb) in the early Eighties to 6 or 7 ppb by 2050. The amount of nitrous oxide in the atmosphere is likely to increase by 20 per cent over the period, while the concentration of methane will double. The concentration of carbon dioxide will double by the end of the 21st century.

All these gases affect both the composition and the temperature of the upper atmosphere. They trap heat near the ground, by the green-house effect, and this makes the stratosphere cooler. This tends to increase the concentration of ozone, because reactions that destroy ozone in the stratosphere proceed more slowly at lower temperatures.

At some altitudes, the general chemical effect of methane is to increase ozone concentrations, while at others it contributes to ozone destruction. Nitrous oxide contributes to ozone destruction throughout the stratosphere.

The scenario suggests that the ozone lost from a column of air overhead near the equator by 2050 will be only about one per cent. This holds over an area containing 70 per cent of the Earth's surface, within latitude bands 45° either side of the equator. There could be a modest increase, of about 0.2 per cent, in ozone concentrations in a column of air near the poles. These total column changes are small because most ozone is in the lower stratosphere, where the air is thicker and even a small percentage increase in concentration can overwhelm a large percentage decline in ozone higher up, where the air is thinner.

The effects on temperature, however, are much more dramatic. The stratosphere cools both because heat is trapped near the ground by greenhouse gases, and because ozone is destroyed at high altitudes. This lets ultraviolet radiation penetrate deeper into the atmosphere before giving up its energy. So the two effects add together, instead of tending to cancel each other out. As a result, at an altitude of 50 km above the equator, the scenario suggests a decrease in temperature of 15K.

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FERTILISER NEWS

GFCL presses for urea plant in Godavari basin

Godavari Fertilisers and Chemicals Ltd. (GFCL), having successfully commissioned its Rs. 138-crore DAP plant at Kakinada, is pressing its case with the Union Government for setting up a 2,250 TPD urea plant based on available gas from the Godavari basin. basin. GFCL applied for a letter of intent sometime ago for a gas-based ammonia plant.

Official sources in Hyderabad point out that the State has a very good case for a second major nitrogenous fertiliser plant in the Eighth Plan period as the growing demand (estimated at 1.5 million tonnes) in the region will have to be met by fertiliser imports as suggested by the Dr. Varadarajan report. Dr. Varadarajan's report did not reckon with huge gas finds in the Krishna-Godavari basin in its report and thus ruled out new fertiliser plants in the region.

ONGC has established that the prognosticated resource base in the basin is 337 billion cubic metres of gas and of this 24.59 million tonnes has been converted into geological in-place reserve (13.20 million tonnes in oil and 11.39 million tonnes oil equivalent of gas). ONGC has offered regular supplies of upto three million cubic metres of gas per day in the basin commencing 1990 onwards.

The State Government expert committee had recommended in its report last year that the gas finds can support two fertiliser plants, one of Nagarjuna Fertilisers and Chemicals (by switching over from naphtha) and the second by GFCL which has the equity support of IFFCO and the AP Government.

The other recommended use of gas was for setting up three 33 mw generation plant by APSEB. All the three proposals together envisage a peak utilisation of a little over three million cubic metres of gas per day that will be available.

It is, therefore, stated that it will take three to four years for building a fertiliser plant of the size envisaged by GFCL while laying of pipelines by ONGC will take about two years. Synchronisation of the two activities will be required and thus the application of the two activities by GFCL requires a high priority consideration by the Union Government.

Engineers India Ltd. in its prefeasibility report to the State Government, has suggested an integrated development of the Godavari basin and favourable consideration of the GFCL proposal. Having the backing of IFFCO, it will make the second plant a reality, sources state.

DEEPAK FERT. TO EXPAND EQUITY

As a part of the financing scheme for its massive diversification programme, Deepak Fertilisers and Petrochemicals Corporation will approach the shareholders shortly with an attractive proposal for raising additional finance. The company will strengthen its equity base and will be able to finalise the overall financing scheme after IDBI approves the ANP projects, according to Mr. C.K. Mehta, Chairman of the company.

Addressing shareholders at the company's annual general meeting Mr. Mehta said that to enlarge the sphere of its operations the company has selected a product mix of fertiliser, petrochemicals and industrial chemicals.

Accordingly, the company has taken up for implementation projects for manufacture of ammonium nitrophosphate (ANP) fertiliser, methanol, weak and concentrated nitric acids and explosive grade low density prilled ammonium nitrite (LDAN) at the existing site. In addition, the company has also undertaken an energy-saving retrofit scheme for the existing ammonia plant whereby the energy consumption will be reduced by about 10 per cent.

He further said that the ca ammonia would be captively for production of nitric acid w turn is a major raw material fo fertilisers, concentrated nitric (CNA) and LDAN. The compa pendence on outside consume virtually cease, as the total a production would be consum house, bringing to the company sociated cost benefits.

The ANP fertiliser proposed manufactured by the company have special features of higher soluble phosphate nutrient in a to the balanced contents of am cal and nitrate nitrogen and ph us. These features would mak company's product a preferred ser for which a ready market all over the country.

The explosive grade LDAN ed to be manufactured by the co would be a high quality state art. Easy availability of this product would enable wide us such explosives which are signi lower in cost than the conve explosives now in use.

There is at present an acute tage of CNA in the country. W easing of the CNA supply af completion of the company's p the domestic requirement wou met and export of CNA-based d termediates, fine chemicals etc. be boosted.

The company has already re the complete basic engineering p for the methanol projects. The ed engineering and procurement ties are in progress. The collab agreements for all the projects also been made effective and the engineering work has commence

The IDBI has already complete appraisal of the methanol, nitric CNA, LDAN and energy saving fit projects involving a capital of Rs. 170 crores and has ap financial assistance of Rs. 35 Additional rupee loans of Rs. 2 res have also been tied up w bankers.

Immediately upon the receipt Government approval the updated estimates of the ANP project had submitted to IDBI.

liser buffer stock suggestion rejected

n Government has re- gestions for maintaining tock of fertilisers to take ortfalls in consumption in of unfavourable weather

those pleading for a buffer he fertiliser industry.

overnment, which has ex- e issue in detail, is of the t the creation of a formal ock is not warranted. It is iew that the earlier system ling imported fertilisers the Food Corporation of In- I) which was more or less intaining a buffer stock was efficient nor cost-effective.

are also other reasons for g the concept of buffer stock. ertilisers have a lower shelf compared to wheat and su- his would require a faster r, which would add to the

dly, consumption of fertili- skewed as compared to the uniform consumption of foodgrains and sugar. Therefore, building up of adequate stocks in the beginning of the main consumption season is inevitable.

Besides, foodgrains are issued mostly to urban consumers and can be moved from the warehouses at short notice, whereas fertilisers have to be supplied in the rural areas to 90 million farm families and need to be prepositioned.

About the glut in fertilisers, the Government is of the view that the nature of the problems associated with fertiliser supply management is such that supply and demand cannot be exactly matched.

Large quantities of fertilisers remain at the ports, in factory silos and in transit in railway wagons and trucks and are thus not available for sale to consumers.

A portion of the stocks available with the wholesalers and retailers may also be mismatched. That is, the fertiliser stocks may not be close to the areas having unsatisfied demand.

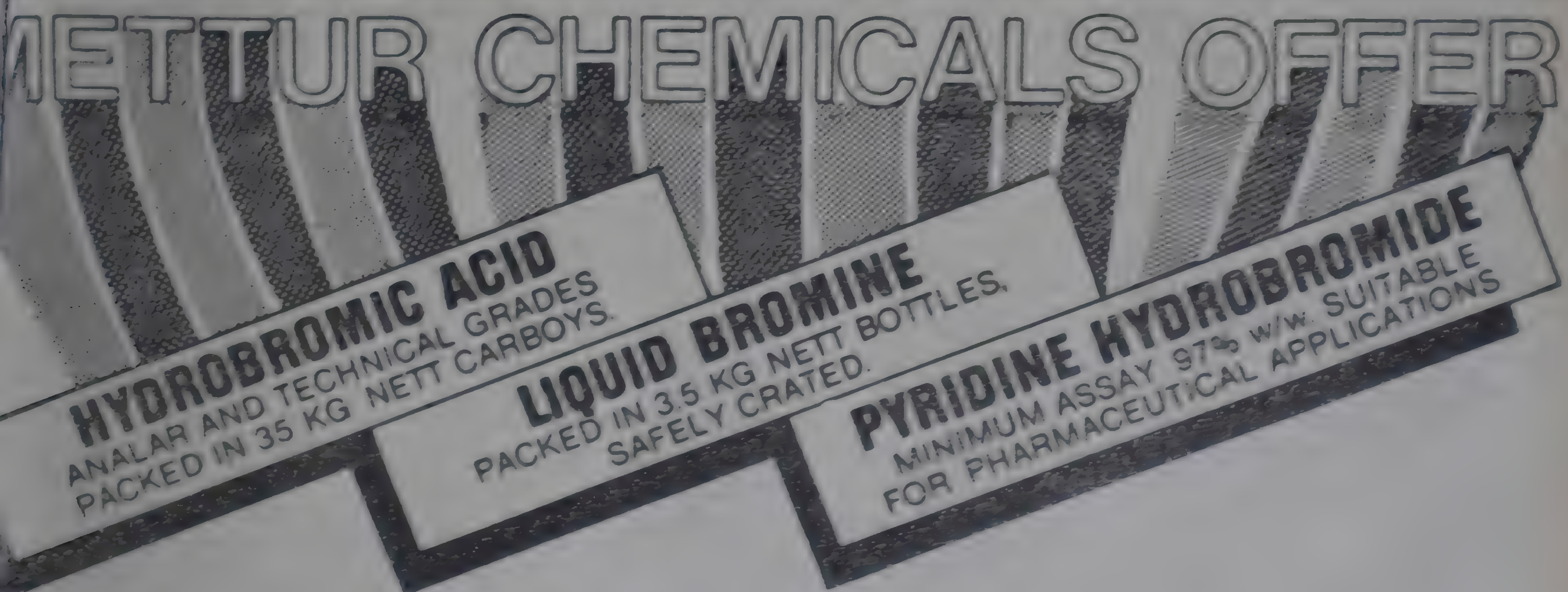
Because of these logistical problems, a quantity of about 1.5 million tonnes of nutrients acts as the minimum level which, though physically present, is not available to the farmers.

In 1987-88, because of the unprecedented drought fertiliser stocks have been on the higher side throughout. The situation of oversupply could have been avoided but for the poor weather conditions and actual consumption falling short of targets.

The total fertiliser stock in the country as on April this year was 3.55 million tonnes, of which 2.66 million tonnes were with the manufacturers.

As a result, no urea is proposed to be imported this year. In 1987-88 there was a drastic reduction in imports. A small quantity of urea, however, had to be imported to meet certain international trade commitments.

The Government is hopeful that because of the good monsoon in the current season, the fertiliser market would stabilise by the end of the year.



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5 gas-based fertiliser units in Gulf planned

The Union Government is planning to set up as many as five gas-based fertiliser units in the Gulf countries jointly with some well-known multinationals.

The decision to move offshore a sizeable part of the additional capacity in fertiliser is being defended in the name of reducing the overall cost of the principal farm input supplied in the country.

It is understood that much spadework has already been done to identify the possible location of the units as well as their ownership pattern

In four out of the five, the Government will have minority shareholding. In the Abu Dhabi unit, however, India will hold majority shares. Exercise is under way to finalise the size of each venture.

What "tempts" the Government to go abroad, according to official sources, is the easy accessibility to low-cost capital on the one hand and the cheap rates at which the gas is being sold in the Gulf area, on the other.

On a rough estimate, it will be possible to set up a 1000-tonne per day (TPDA) ammonia urea plant in Gulf at $ 250 million. Massive economies of scale are assumed there in the form of proximity of raw materials, almost nil investment on transport and the tax-free import of capital goods.

At the same time, it would need about $ 500 million to install a similar plant in India taking into account the heavy taxes and the high interest rate structure, it is pointed out. What actually tilts the scale in favour of the overseas projects is the low, and practically negligible, price of gas in the Gulf.

It is felt that the effective utilisation of gas from the ONGC wells is out of question so long as the public sector undertaking is charging monopoly rates for its products. The ONGC rate for a million British thermal units is the equivalent of five dollars. In Gulf, it comes 10 times cheaper at 50 cents.

It is understood that Haldor Topsoe, the Denmark-based satellite concern of the controversial Italian fertiliser giant Snam Progetti, is playing a key role in promoting the cause of the new foreign projects.

Though the Government has made up its mind on the question of the fertiliser projects proposed in Gulf, criticism is smouldering in a section of the experts attached to the other economic ministries.

Apart from the political risks incidental to all investments in Gulf, it is argued that the Government had not done the necessary homework on the national income accounting of the proposed investments.

As a rule, import components of all investments on fertiliser plants account for no more than 20 per cent of the outlay.

The multiplier effect of the rest of the investment on industry, employment and other segments of the economy would offset in the process a part of the burden of high costs.

Meanwhile, in the South there is more concern about the future of the ambitious plans being drawn up to use the gas from Krishna-Godavari and Cauvery basins. It is reckoned that K-G Basin will yield six million cubic metres of gas in the coming decade and the Cauvery Basin another two million cubic metres. Together they can sustain as many as eight fertiliser plants.

The diversion of attention and funds to investments in Gulf, raises a few questions over the possible use of gas from the area.

For the moment, the Government is presumed to be guided by the need to contain the capital cost of investment on nitrogeneous fertilisers which had firmed up to Rs. 14,300 per tonne in 1986-87. If one goes by the Varadarajan Committee report, the country would have to import 35 lakh tonnes of fertilisers in 1994-95 to cover a deficit estimated at 51 lakh tonnes.

UP CM'S PLEA ON SHAHJAHANPUR FERTILISER UNIT

Uttar Pradesh chief minister Narayan Datt Tiwari has urged the Central government to give speedy clearance to the setting up of a gas-based fertilised plant at Shahjahanpur. In this connection, he met Union minister of state for fertilisers Mr. R. Prabhu at New Delhi on July 24.

This project was initially en
ed to the Apeejay group of com
nies. But it did not take effec
steps to convert the letter of in
into an industrial licence. As a
sult, the validity of the letter
intent expired.

Thus the plant has not got of
ground so far and the quantity
natural gas from Bombay-High
allied fields, which was earmar
for the project, has thus rema
unutilised.

Mr. Tiwari emphasised that
further delay in the project w
cause a serious setback to the fu
plans of fertiliser production in
country.

The UP chief minister also
cussed the feasibility of setting
more electronics units in the s
with the secretary, Electro
Commission.

Mr. Tiwari wanted more
oriented small industries to c
up in the state, according to a
lease issued by the U.P. Informa
Centre at New Delhi.

GNFC CONTINUES TO DO WE

Gujarat Narmada Valley Fer
ers Company Ltd. (GNFC) Bha
has maintained its rapid st
with excellent performance in
rious operations for the year en
June 1988.

The ammonia plant produce
total of 4.13 lakh tonnes of am
nia registering capacity utilisa
of 92.75 per cent. Similarly,
urea plant also produced 6.24
tonnes of urea with capacity
lisation of 105.02 per cent and
thanol plant producing 20.204
nes with capacity utilisation of 1
per cent.

The urea plant and the me
nol plant have recorded over
per cent capacity utilisation
secutively for last three years
two years respectively. The
formance of the ammonia plant
ing the last five years has b
steadily rising and the plant
duced 44.155 tonnes of amm
registering a capacity utilisation
105.5 per cent during March
year.

STOP SECOND REGISTRATION

Pesticide formulators agitated

formulators are agitated reported decision of the nsecticides Board to stop d registration for pestici- r Section 9(4) of the Cen- ecticides Act.

IB had abruptly stopped second registration for pes- under Section 9(4) a few go. Until recently once a ecticide is registered under 9(4) B of the Act, anyone could get a second regis- for the same product.

ulators have taken a stand opping registration under 9(4) would result in the for- of cartel among the existing acturers and an inevitable hike of technical material by

will also amount to the intro- n of Patent Act under the Convention through the back- The government of India is signatory to the Paris Conven- which provides patent protec- for 14 years.

e manufacturers of technical rial in particular have been ding with the government for to provide some period of pro- ion to help them introduce more pesticides in the Indian mar-

ountering the argument raised the multinationals and large panies that they are discouraged m introducing new pesticides as re is no protection, the formula- s say that there is enough market any new pesticide in the coun-

or instance, fenvalerate and cy- methrin, two synthetic pyreth- s, were introduced by multi- onals in 1982-83 after registering ler Section 9(3)B. Many medium small-scale companies were sequently given registration for se products under Section 9(4), s drastically bringing down the ce of these pesticides in the fol- ving years.

envalerate 20 per cent EC used be sold at a price ranging from 500 to Rs. 600 per litre and fen- erate technical at Rs. 1,000 per in 1983-84. Today the market ce of fenevalerate 20 per cent EC Rs. 200 per litre and that of fen- erate technical Rs. 635 to Rs. 650 kg.

the case of cypermethrin also the price had come down sharply during the period of four years. In 1984, when cypermethrin technical was introduced by multinationals under Section 9(3)B, the product used to be sold at Rs. 2,200 a kg However, with the granting of 10 to 15 per cent registrants under Section 9(4), the price came down to Rs. 1,850 a kg. In a representation to the Union ministry of agriculture, Mr. Pradeep P. Dave, president of the Pesticides Formulators Association of India has stated that the decision of CIB would be a big blow to the formulation industry.

Pesticide formulation industry is already overlicensed and the capacity utilisation is only about 40 per cent. In this context, stoppage of registration under Section 9 (4) would result in further creation of idle capacity, Mr Dave said.

As the product obsolescence is very high in pesticides industry, introduction of newer products in the market is very important for survival. Protected registration to the first registrant would thus prevent new units — particularly small scale units — taking up manufacture of new pesticides.

At present, in the absence of product patents and protected registration, there is a healthy competition among technical grade pesticides manufacturers resulting in reasonable prices for various pesticides. It was important that this trend be continued in the interest of farming community, Mr. Dave said.

SPECIAL CARD FOR EXPORTERS IN OFFING

The Union Government will shortly issue a special card to exporters.

Addressing the "seminar-cum-open house meeting" organised by the State Bank of India (SBI) at Bombay, the Federation of Indian Export Organisation's President, Mr Ramu Deora said, initially the cards would be issued to all trading houses so that their problems with banks and custom authorities would be cleared immediately.

With such support from the Government, he hoped that the export houses would be able to achieve an export target of Rs. 10,000 crores until 1990.

However, Mr. Deora felt that more adjustments in our export promotion policy are necessary since many of these schemes have several shortcomings.

Reacting to the exporters' demand for scrapping the credit authorisation scheme (CAS), Mr. Deora said, it is under active consideration of the Union Finance Ministry.

ENERGY CONSERVATION SPECIFIC PROPOSALS SOUGHT FROM INDUSTRY

Mr. B.K. Rao, secretary, mines asked the Aluminium Association of India to come up with specific proposals indicating the equipment that may be required to be imported for effective energy conservation.

He was speaking at a one-day round table discussion organised by the association for discussing the energy audit report of the Bureau of Industrial Costs and Prices (BICP).

Mr. Rao assured that the government continues to encourage the efforts of the industry in energy conservation in import of equipments, if necessary, and to offer fiscal support.

Mr. Rao described the BICP reporrt as "timely" and hoped that the proposed Jawaharlal Nehru Aluminium Research Design and Development Centre would act as a permanent body for monitoring energy conservation.

Dr. V.L. Kelkar, chairman BICP, who was the chief guest assured support of his organisation in achieving energy conservation goals. He said India could be with proper management, a major net exporter of aluminium in the context of the international scenario of the existing price differential. He regretted that unlike in the west, where there were falling trends in per unit consumption of energy in the production of aluminium, there was no perceptible success in India so far.

Mr. K.L. Puri, advisor energy conservation, said state electricity boards were at liberty to charge even higher rates if they could ensure uninterrupted and reliable power supply. But if power supply was interrupted and proper quality was not supplied, the boards could charge only at the lowest rate, if not free he added.

Mr. A.K. Agarwala, president of the association, called for supply of power to aluminium smelters from National Thermal Power Corporation (NTPC), and for the removal of electricity duty on captive power generation.

Fiscal adjustments for 2 major pesticides likely

The Union Government has decided that some fiscal adjustments have to be made in respect of two major pesticides being manufactured in the country, monocrotophos and butachlor. Also, reintroduction of physical controls on the import of these two pesticides has been ruled out.

The decisions have been taken on the basis of the report, the Department of Chemicals and Petrochemicals has received from the Bureau of Industrial Costs & Prices (BICP) on the domestic price trends for monocrotophos and butachlor. BICP was asked by the department only to examine the price trends for these two pesticides about a month ago.

The BICP report has shown that the domestic producers of monocrotophos and butachlor are not charging unreasonable prices. BICP had analysed the raw material prices the manufacturers of the pesticides were paying on account of the domestic duties and import levies. Considering these factors, BICP came to the conclusion that domestic producers were not 'fleecing' the agricultural users.

According to official sources, discussions between the petrochemicals department and the Finance Ministry on the nature of fiscal adjustments to be made are now being held. There are two proposals being considered in these discussions.

First, the import duty on monocrotophos and butachlor, which was reduced soon after the presentation of the Union Budget of 1988-89 to [illegible] per cent, should be hiked again to 105 per cent. An increase in the import duty level on these two pesticides is expected to give reasonable protection to the domestic producers.

Secondly, the import duty on the raw materials, which are used for manufacturing these pesticides, should be reduced to a level that the domestic units get them at considerably cheap prices to ena
market the final produ
cides at prices which e
products to compete w
successfully.

Either of these propos
cepted, will help the do
ducers of monocrotophos
chlor reduce their total c
duction and bring down
further. Already, the C
has put pressure on comp
ducing these pesticides to
wn the prices to the mi
has succeeded in reducin
reasonable levels.

As such, the Governmen
intend to re-introduce ph
trols on imports of the t
des. These products, now
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nicals Research Institute
major break-through
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lysis is a membrane
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ONT TO MAKE REVERSE SIS MEMBRANES IN SAUDI

burgeoning economic, indus-
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and equipment. With the
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This company is a wholly owned subsidiary of the Du Pont Company in the United States, which has been the worldwide provider of Du Pont's patented PERMASEP* permeator. Du Pont developed and continues to manufacture, this basic component of reverse osmosis systems which now also will be made by WMMC. These hollow fiber permeators separate and remove the dissolved solids from the source water in a relatively simple, inexpensive reverse osmosis process, to produce potable water. There are thousands of highly efficient water desalination plants using PERMASEP permeators that have been operating for years in the Gulf Countries, the Caribbean and other areas throughout the world where water desalination is critical.

RECORD OUTPUT BY NFL

The National Fertilisers Limited (NFL) plants achieved a record production of 1.49 lakh tonnes of grade 'N' fertilisers during the first quarter of the current financial year, registering an increase of 26.1 per cent over the corresponding period in 1985-86.

At the Panipat unit of NFL production during the quarter was 61,100 tonnes of nitrogen equivalent to a capacity utilisation of 104 per cent. This is the best performance the unit had achieved for any corresponding period so far.

Meanwhile the Nangal unit of NFL has been awarded the "award of honour" by the National Safety Council, United Statets, for the unit's outstanding safety performance achieved in 1987. The unit had won 61 national and international safety awards so far.

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Government urged not to ban 'baby boilers'

Manufacturers and users of "baby boilers" have urged the Industry Secretary, Ms. Chitra Sordia, against the Maharashtra Government's move to ban their use.

An estimated 1.5 lakh baby boilers are in use all over the country, mainly by small-scale units whose steam requirements are limited.

Inaugurating the General Boiler Board meeting at Pune on July 1, Mr. S.S. Barve, Secretary, State Labour Department, called upon the body to prohibit manufacture and use of such "substandard" boilers.

According to users of baby boilers, such boilers have almost a zero accident record. They allege that Government inspectors have been urging users to scrap them and replace them with larger versions which fall under the purview of the Indian Boiler Regulation (IBR) Act.

The real reason behind the move to ban such boilers, according to an inside source, is the increasing preference for such small boilers among industrialists and not their safety record. As they do not technically come under the IBR Act, the boiler inspectors feel that their power has been eroded. Users say that if the boilers do not come under the purview of the Act, the inspectors should leave them alone. Instead, inspectors have been saying these are unsafe boilers and have been persuading the users to get them replaced.

Instead of a ban, the Government should specify the safety standards and regularise them, the small-scale units feel. The smallest boiler under the IBR Act costs Rs. 1.25 lakhs. Replacement of 1.5 lakh numbers of baby boilers will cost almost Rs. 2,000 crores.

Even if they are forced to go in for IBR boilers, existing boiler manufacturers will need to go in for years to manufacture the required [illegible] steam to warrant their installation, it is felt.

ZUARI AGRO TO TAKE OVER ARAVALI FERT.

Zuari Agro Chemicals Ltd. is to take over Aravali Fertilisers Ltd. The Centre has passed the necessary order to this effect. The take-over will be through purchase of 180,00,000 equity shares of Rs. 10 each at par out of fresh issue of capital. The investment of Rs. 18 crores will be made out of Zuari's internal resources. Aravali was promoted by the Zuari to set up a gas-based fertiliser plant in Rajasthan. It will be financed partly by the issue of equity capital of Rs. 101.40 crores. Out of this the Zuari's equity investment is Rs. 18 crores and the balance is to be subscribed by other co-promoters and public. Zuari has told the government that it will subscribe Rs. 18 crores in the equity initially of the investee company before the amount from others under the promoters category is raised. This would result in Aravali becoming a subsidiary of Zuari. However, as and when the subscription to the capital is made by other copromoters, says the official order, "the status of the investee company (Aravali) would change to subsidiary company." In another development, the government has also given its consent to eight other companies belonging to other groups, making inter-corporate investment to the tune of Rs. 886-odd lakhs in different companies through purchase of equities.

DESALINATION PLANT ON IN MADRAS SET UP

A desalination plant with a 50,000 litres a day capacity has been set up in Madras by a private firm in collaboration with "Metrowater" and with technical assistance from a Japanese firm.

The plant, put up by the Titanium Equipment and Anode Manufacturing Company (TEAM) has a recovery rate of 35 per cent. For every 100 litres of sea water fed in, 35 litres of pure drinking water is obtained. The remaining 65 per cent [illegible]

Mr. C.H. Krishnamurth airman TEAM, told a pr rence that the plant was the reverse osmosis techn polyamide membrane. Ar ensured that micro-orga cluding virus, were remov cent.

All the components of designed and constructed with technical help from ter Treatment Compan were imported.

The sea water is pumpe 18 metre deep well, abo tres from shore, into a tank for removal of sus lids. From there it is take a sand filter and into the r The potable water is ther an overhead tank connec filling point.

Mr. Krishnamurthi Rao working of the plant was died closely by a group from the TEAM and M The peformance data an of production would be by the two organisations meeting soon.

The Metrowater, he sa be taking five tanker-loa ter from the plant. I plant five hours to produ potable water to fill one added.

IDMA CALLS FOR SPEC MEETING ON SEPT. 24

Mr. Vinodbhai Shah, pr Indian Drug Manufacturer tion, has called a speci body meeting of the Asso September 24, 1988.

The decision to call general body meeting been taken to finally settl going rift between the committee members of ID

It has to be recalled tha the office bearers of the cluding vice president a secretary had resigned back in protest against th functioning of Mr. Shah.

After the resignations of bearers the members of tive committee have been the IDMA president to co executive committee meeti [illegible]

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Ambitious export plan soon

India is to launch an ambitious export programme in the pharmaceuticals, chemicals and petrochemical sectors to earn foreign exchange worth Rs. 1,000 crore by the end of the Seventh Plan (1989-90).

Addressing the economic editors conference the Union Industries Minister, Mr. Jalagam Vengala Rao said the programme included export of non-traditional items like polyester staple fibre, filament yarn and woven sacks.

In the petrochemical sector, which is a thrust area, the Government had chalked out a long-term and a short-term strategy to meet the growing demand for plastics and polymers in the country.

The long-term strategy consisted of setting up of olefin and aromatic complexes based on naphtha and gas in the coming years. The Government would start sanctioning these projects from next month, he said.

Mr Vengala Rao said investors abroad had shown a keen interest in India's petrochemical projects and the Government expected a substantial flow of funds from abroad to meet the growing demand for polymers.

The short-term strategy comprised building up of raw material banks to meet the requirements of the domestic consumers. The Government had earmarked about 270,000 tonnes of polymers in the current year and almost 40,000 tonnes in the next financial year to meet the local demand.

Mr. Vengala Rao said his Ministry had prepared a programme to increase agricultural productivity through the use of plastics in land and water management.

He said the overall financial performance of public sector enterprises had shown a steady increase. During 1986-87 they made a net profit of Rs. 1,770 crore against Rs. 1,170 crore during 1985.

Flash results for 1987-88 indicated that the public undertakings would more or less maintain the same level of profits. The investment in these enterprises was about Rs. 65,000 crores and their turnover was Rs. 75,000 crores, Mr. Rao said.

The manufacturing enterprises under the Department of Public Enterprises had increased their production from Rs. 4,811 crores in 1986-87 to Rs. 5,493 crores in 1987-88, achieving a growth rate of 14 per cent. In the current financial year, the projected growth rate was 18 per cent, which would take the turnover to a record Rs. 6,483 crores he said.

Outlining various measures
by the Government to strea
the procedure for industrial ap
vals, Mr. Rao said, these were
of an overall economic develo
strategy to release and prom
growth impulses in the econ
Induction of the latest techn
promotion of modernisation mea
and upgrading the standards of
products would be the enterp
major aims in the coming mo
he added.

NON-TRADITIONAL ITEMS

Exports up substantially

Exports of non-traditional items from India recorded significant growth in 1987-88.

Engineering exports are estimated to have increased by Rs. 462.69 crores from Rs. 969.30 crores in 1986-87 to Rs. 1,431.99 crores in 1987-88.

Chemical and related products exports went up from Rs. 930.72 crores in 1986-87 to Rs. 1,280.5 crores in 1987-88, showing an increase of over 37 per cent.

These trends also indicate that chemicals, with exports for the first time crossing the Rs. 1,000-crore mark, are fast catching up wth engineering goods to emerge as one of the leading non-traditional sectors of India's exports, according to an official release.

Non-traditional export items consist mainly of manufactures and high-value items like engineering manufactures, chemicals, leather manufactures, readymade garments, processed food and marine products, as district from traditional export items like tea, coffee, spices, minerals and ores.

There are signs of accelerated growth in exports of some of the most competitive segments of high value-added manufactures including leather garments and footwear, bicycles and parts, four wheelers and two wheelers, electronics and software, chemicals, dye and dye intermediates and bulk drug formulations.

In the chemicals sector exports of dyes and dye intermediates doubled in one year from Rs. [illegible] crores in
1986-87 to Rs. 213.98 crores in
88. Basic drugs and finished
mulations' exports have gon
from Rs. 189.28 crores in 1986-
Rs. 227.95 crores and of medici
tor oil from Rs. 33.67 crores in
87 to Rs. 61.73 crores in 198
while exports of inorganic and
ganic chemicals including agro
micals have also risen substan
to reach Rs. 92.17 crores in 19
compared to Rs. 66.21 crores in
87.

Exports of leather and le
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1986-87 to Rs. 1,148.24 crores
cating growth of 47 per cent
also the response of this sect
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for easy access to raw materials
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Another significant develop
seen from export trends is that
ports in thrust sectors have sh
growth of 48 per cent during
88. Simultaneously the contrib
of thrust sectors to India's tota
ports have increased to 70 per
in 1987-88 as against 63 per cen
the previous year.

Of the 14 thrust sectors iden
for special promotion 12 have sh
good growth. Thus apart
basic chemicals, leather and lea
manufactures and engineering
ch covers capital goods, electr
and computer softwares and
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in 1987-88 in relation to 1986-87

ILABILITY OF BAUXITE

Balco's production may stop

sibility of India being sur- luminium metal from 1988- ds for some years is gra- ing from sight as pro- from the state-owned Bh- minium Company (Balco) me to a complete halt due availability of baxuite from ing captive mines at Phu- r and Amarkantak.

with a annual installed pro- capacity of one lakh tonnes ortedly anticipating that it not be able to contribute any to the country if it is not al- to procure baxuite ore from w captive mines at Gandha- an in Orissa with a capacity of kh tonnes per annum. With gradual depletion of the exis- captive mines of Balco at Phu- and Amarkantak in Mad- Pradesh, the Union government sanctioned in July, 1982 open- of new captive baxuite mines in at an estimated cost of Rs. crores which was scheduled completion by April, 1985.

here has been inordinate delay onstruction of the new mine pro- due to procedural delays in ac- sition of private and forest lands, ile the work at the project came a complete halt in the end of 5 for want of environmental arannce and agitation by a sec- of the local people fearing en- rnmental and ecological disturb- es as a result of mining opera- is. As things stand now, there is possibility of Balco getting Baux- from the Orissa mines. In the antime. however, the cost of the ject has gone up to Rs. 62.70 cro-

t is estimated that the present in- lled capacity for production of minium in the country is 3.62.000 nes per annum (tpa). When Na- nal Aluminium Company Ltd., lco) goes into full production in 9. the installed capacity will in- ase to 5,80,000 tpa. Under auto- tic growth, Hindalco has been al- ed expansion from 1,20,000 tpa 1,50,000 tpa. The licensed capacity of primary aluminium will thus be 6,10,000 tpa. At the time of assessing the total installed capacity, the installed capacities of Indal, Malco and Balco have also been taken into account although these three primary aluminium producers are, in fact, limping due to one reason or the other.

It has further been projected by the Union ministry of steel and mines that the country will have a surplus aluminium production of about 10 tonnes in 1988-89 and 40 tonnes in 1989-90, against deficit of production of about 46 tonnes in 1985-86, 73 tonnes in 1986-87 and 70 tonnes in 1987-88. The surplus in 1988-89 and 1989-90 is being assessed on the basis of demand and domestic production of 380 tpa and 400 tpa, respectively in 1988-89 and 430 tonnes and 470 tonnes respectively in 1989-90.

Informed sources are of the view that the production as projected for 1988-89 onwards could not be materialised as Indal. Malco and Balco might not be able to contribute as expected by the governmennt.

To substantiate their apprehension, they say that Balco will not be able to utilise its installed capacity due to non-availability of baxuite Indal's primary aluminium production may continue to suffer due to power shortage at its major smelters at Belgaum in Karnataka and at Hirakud in Orissa, while Malco is now notified a sick industrial unit.

The Board for Industrial and Financial Reconstruction (BIFR) has, in the meantime, come to the conclusion that it is not practicable for Malco to make its net worth positive within a resonable time. The reasons for sikcness have been attributed mainly to power cuts and the company cannot become viable without modernisation. In the circumstances, Malco may not be able to produce much.

TECH. IMPORTS DISCLOSURE: FEE NORMS EASED

The government has withdraw the condition that payment of dis closure fee for technology import should be allowed only through de sign engineering consultancy com panies and public sector units.

It will now be possible for companies entering into foreign collaborations to directly avail of the facility of paying disclosure fees in foreign exchange.

In March this year the government had decided that disclosure fee could be paid in foreign collaboration, cases involving total technology payments of over Rs. one crores

In cases where the letter of intent had been issued to the entrepreneurs and where the need for foreign collaboration was clear, entrepreneus were to be allowed payment of disclosure fee up to a ceilisg of $40,000 automatically. In excess of this amount, government approval was to be sought.

According to industry ministry sources, it was subsequently found that the stipulation that consultancy companies and public sector enterprises should be involved proved to be an unnecessary hindrance for companies seeking to import technology.

SEMINAR ON PLASTICS IN PACKAGING

The All India Plastics Manufacturers' Association (AIPMA) is organising a seminar on "Role of plastics in packaging of food products" in New Delhi on August 13, 1988. Mr. Jagdish Tytler, minister for food processing will inaugurate the seminar.

The seminar will focus attention on advance in multilayer and aseptic packaging; new developments in rigid packaging and safety, security and standard for plastics packs in India.

Satellite for ocean sensing to be put up next year

India's efforts to learn about its seas will get a boost when a satellite exclusively for ocean sensing is put in orbit by the European Space Agency next year.

Called ERS or the European Remote Sensing Satellite, it will enable Indian scientists to determine with greater accuracy various parameters of the Indian Ocean.

Preparations already are afoot at the National Institute of Oceanography (NIO) at Dona Paula Goa to receive the data from ERS when it becomes operational.

NIO scientists are now ready to receive data from Japan's marine observation satellite launched recently.

The Japanese satellite is to provide data about the Bay of Bengal.

Indian scientists have been studying the ocean behaviour for the last four years using data obtained from Insat, NOAA and Landsat. The work began when "Bhaskara" was was put in orbit in 1984.

Imageries sent by NOAA have been used to determine the sea surface temperature and data from Landsat-four analysed to know the country's coastal geomorphology, the scientists say.

NIO has already established an in-house ocean remote sensing centre and has started training its scientists to analyse satellite pictures using computers under a United Nations Development Programme (UNDP)-funded project.

"We have been using pictures from Insat for studying cyclones and the sea surface temperature" says Mr. L.V. Gangadhara Rao, Co-ordinator, Ocean Remote Sensing Programme at NIO.

NIO scientists have been analysing Insat pictures supplied by the Hyderabad-based National Remote Sensing Agency and data provided by the Indian Meteorological Department.

NIO has drawn up plans to set up satellites receptors at various points in the country to directly get data from satellites. It is also developing computer software to study the ocean behaviour using models.

Scientifically, all sens
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"We then make us
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NTH AS ALTERNATE ENERGY SOURCE

Research on in Hassan

, which is generally waste offers a good alternate source of

With the research and activities going on in a [illegible] in India on al- [illegible] of energy?, Malnad [illegible] Hassan, Kar- [illegible] board and Has- [illegible] have jointly ven- research scheme to pro- gas from the easily hyacinth in the near- [illegible] land for convert- ectricity.

That the basic technolo- generation of methane hyacinth has been esta- laboratory stage and to be taken from the the mass production [illegible] institutions are now process for the same.

Manjunath, who has spe- ollution control and ana- [illegible] working in eering departments of ineering college and Mr. [illegible]han executive engi- Hassan have taken up the incipal investigators and njundaram head of me- engineering department, Nagaiah Shetty, head of of electrical engineering, ayakeerthi, head of che- artment and three others would work as co-investi- he research scheme.

Nanjundaram said that ree problems so far iden- implementing the project [illegible] solved.

[illegible] said that due to cal difficulties encounter- [illegible] the raw material — the digester — scum for- [illegible] the process has not application. Efforts he d be made in the present tackle these problems.

[illegible] project involves resear- nature and studies on [illegible] of the water [illegible]

[illegible] and the present [illegible] some modifications [illegible] producing [illegible] on the [illegible] of

bio-gas. The dome to be put on the cement digester was ready.

Bio-gas thus produced would be made to mix with small portion of diesel (upto 20 per cent) as supplementary fuel and made to run with diesel supplemented generators, which would be again supplied on to the supply grid.

The potential of anaerobic digestion of water hyacinth to yield large amounts of methane would be converted into alternate current through a motor run generator.

The present project is proposed to investigate the various aspects of bio-methanation of water hyacinth, such as the efficiency of conversion, improvement of the quality of bio-gas, synchronising the operation of anaerobic reactor with the generator, etc. Optimisation of the system and economic implications will also be studied in detail Dr. Manjunath observed.

In addition to water hyacinth, digestion of other raw materials such as parthenium will also be investigated, said Dr Nanjundaram.

The present project will also throw light on the technical and economic feasibility of generation of power through methane, which is available in abundance in nature.

Reportedly Hassan zilla parishad has sanctioned Rs. one lakh towards the project, which is estimated to cost Rs. two lakhs rupees.

Construction of the digester and bio-chemical acclimatisation would take about nine months, which would be carried out in the college premises. Developmental activities, trial run of the generator, monitoring and public demonstration would be completed in the rest of the months he added.

Sops soon for energy conservation

Major financial and fiscal concessions for industry are in the offing in order to help it implement energy conservation measures, according to the Advisor (Energy Conservation), Mr. K.L. Puri.

Addressing an energy conservation workshop organised by the PHD Chamber of Commerce and Industry (PHDCCI) in New Delhi recently Mr Puri said the Government is considering incremental assistance to small-scale and tiny units to help boost conservation.

List of energy saving devices likely to be imported is also being considered for duty reduction. In fact, for the first time, the Government has allocated Rs 10 crores for the conservation of energy, he added.

According to an assessment made by the Government, the present power shortage of 10 per cent could be bridged by saving at least eight per cent power through conservation measures and two per cent by way of non-conventional sources of energy.

He said the steps initiated by SAIL, [illegible] cement, refiners, [illegible] and [illegible]er sectors have helped save considerable energy. Some of them have computerised the monitoring aspect.

According to Mr. Puri, the Govt. is also likely to create a separate 'energy conservation forum' so as to bring about an awareness amongst all power-consuming sectors of the energy conservation concept and to offer both assistance and guidance in the matter. Already a joint secretary in the Energy Ministry is co-ordinating with various sectors and is disseminating the success stories of conservation.

A panel ha been created in Doordarshan and All India Radio to propagate the message of energy conservation. His department is also willing to conduct 'energy audit' free of charge to create a model for others. He advised PHDCCI to declare an 'energy conservation day'.

Earlier, the PHDCCI President, Mr M.M. Sabharwal said the Chamber has constituted an expert group on energy audit with a view to [illegible] member-companies [illegible] benefits of energy conservation [illegible]

CEI seeks import of scarce raw materials

Engineering industries throughout the country have come under the grip of acute shortage of critical raw materials. These shortages are playing havoc with the production of engineering goods, according to Confederation of Engineering Industry (CEI) president R. Brijmohan Lal.

In a communication to the industry and finance ministries, CEI has listed zinc, nickel, copper, aluminium, plastics, ferro alloys, steel scrap, pig iron, certain iron and steel links items and carbon dioxide as the key inputs in short supply and has sought crash import of these materials.

The CEI president has pointed out that the price of zinc has gone up by nearly 35 per cent over one year and the quota for individual user has been reduced. Nickel prices are up by over 200 per cent in one year and stand at Rs. 4.25 lakhs per tonne and zinc at Rs. 46,200 per tonne. Copper prices are at Rs. 75,000 per tonne, approximately 40 per cent higher than the 1987 prices. Aluminium is much in short supply.

The engineering industry is also hit by the shortage of pig iron and this has particularly affected the small and medium foundries. Certain iron and steel items such as end quality steel sheets, used by the automative industry are also in short supply.

CEI has had specific suggestions to resolve the crisis. It has pointed out that there is a need to organise crash imports and wherever practicable, some of the raw materials should be put on OGL. This will also help to bring down the open market prices of certain scarce raw materials.

The action which is required from the government is to reduce duty rates in order that levelling of prices can take place since international prices are rising and the levy of import duties at prevailing rates only add to the price escalation and makes it uneconomical for the engineering industry to use these materials.

CEI has also suggested to the government that certain iron and steel items, such as end quality steel sheets, which are required in small quantities and in varying specifications, should be decanalised forthwith.

TECHNOLOGY DATA BANK TO BE SET UP

A national industrial technology data bank is to be set up at an estimated cost of Rs. seven crore.

The bank will collect, analyse and disseminate knowledge on technical, economic and commercial aspects of specified industrial technologies, according to Industry Ministry sources.

The project will be implemented in a phased manner over a period of five years.

As part of its efforts to see that the country kept pace with rapid technologies in developed nations, the Government also proposes to establish a technology development fund, the sources said.

The objective of the proposed fund will be commercialisation of technology which has already been developed successfully upto laboratory stage in the country.

The sources said the other aims include sponsoring and funding of specific research and development projects of national or industry wise importance, provision of venture capital for setting up industries on the basis of indigenously developed technology and updating of technology.

The sources point out that this is in line with the Government's new import-export policy for 1988-89 to 1998-1991, which seeks to emphasise that the momentum of modernisation and technological upgradation in the industrial sector should be sustained. Established manufacturers and exporters have been allowed facilities of imports of capital goods notwithstanding indigenous availability.

The Ministry sources point out that over the years a diversified and [illegible] industrial base has been built up in the country alongwith technological skills and capabilities.

However, to keep pace with th rapid technological advances taki place, selective import of technolog is permitted in high technolog areas.

NEW LICENSING SCHEME TERMED INCOMPLETE

The Federation of Indian Expor ers Organisation (FIEO) has te the simplification of intermediate ad vance licensing scheme as incom plete.

The President of FIEO, Mr Ra S. Deora, in a press release issued New Delhi on July 22, has expres ed that while simplification was welcome step the scheme wou remain a non-starter in the ab ence of availability of incentives li benefit of 100 per cent tax exem tion under section 80-HHC of the I come-Tax Act, eligibility for r cognition as export house tradi house and denial of OCCs even reduced rates.

According to Mr. Deora, if the incentives are made available manufacturers of intermediate pr ducts, the scheme would genera indiginous production create mo employment and lead to impo substitution resulting in considerab savings of foreign exchange.

HIKE IN SHIPPING FREIGHT RATES

The Shipping Corporation of I dia and other member lines of t Minimum Freight Agreement (MF have decided to increase by eig to 10 per cent the freight rates f selected commodities from Septer ber 1.

The increase will cover about dozen items including cotton ga ments, dyes and dyestuffs, spic handtools, fruit pulp and process food.

According to SCI sources the ra for cotton garment will rise by R 100 to Rs. 1600 per container and th of handtools by Rs. 50 to 1,350 per container. Box rate spices would go up from Rs. 1100 Rs. 1200.

This would be the second freig increase on selected items by MF in five months, since April, whe according to shipowners, has be decided upon to minimise the tot impact on the export trade.

import bill may cross Rs. 4,500 crores

il import bill will soar to Rs. 4,500 crore by the end venth Plan (1990) and rise s domestic demand will utstrip supply despite best boost production.

current year itself, imports oil will be more than 18 nnes and petroleum pro- ven million, a steep increase e figure of 12 million tonnes le and one million tonnes for n products registered in

ing imports would pose a urden on an already strain- ign exchange reserves posi- eral measures are being tak- the government to boost indi- production, augment refin- pacity and conserve energy. e this, there will still be an ged gap of about 15 million s of crude which would have to ported in the early years of ghth Plan, according to a back- d paper circulated by the pet- m ministry at the economic edi- conference at New Delhi.

per an estimate, the demand petroleum products would in- e to about 74 million tonnes by -95 and to about 95 million ton- by 1999-2000 AD and availability the basis of existing refining city would be about only 59 on tonnes.

ew strategies and technologies being developed for increasing production of crude oil. These ude enhanced oil recovery tech- ues, repairs of sick wells and de- pment of early production sys-

easures are also being taken to rcice control over consumption petroleum products. Price hikes other fiscal measures are re- ed to from time to tome to curb sumption. Other steps include ng boilers in industries, develop- nt of fuel-efficient stoves, fuel servation in transport undertak- s and promotion of alternative rces of energy.

PACITY CLUBBING NOT LOWED

he Union Government will not inarily allow clubbing of capa- sanctioned through different in- trial licences. This is because h industrial licence specifies that the undertaking concerned is not permitted to exceed the licensed capacity without obtaining a valid industrial licence.

If, however, an entrepreneur desires that the capacities indicated in the different licences should be clubbed together, he will have to make a separate request to the Government to that effect. The ministry concerned will examine the application and, on the basis of its recommendation, a final decision will be taken.

The Department of Industrial Development has indicated to industry representatives that recognition of the capacity of an undertaking is done in terms of the industrial licence issued for the purpose. If different industrial licences are issued to the same undertaking for setting up factories at different locations, the regularisation of capacity has to be considered in the light of the industrial licences issued to them.

Alternatively, industrial units could take advantage of the existing policy as per which undertakings can maximise their production to the extent feasible with the existing plant and machinery and, if necessary, by addition of capital goods marginally upto 10 per cent. They can approach the government after March 31, 1990, for endorsement of the highest production achieved by them on the industrial licence held by the parties concerned.

OIL PRICES RETREAT

Oil futures prices have retreated as traders grew skeptical that a possible cease-fire in the Iran-Iraq war would soon reduce the world over supply of oil.

The August contract for West Texas intermediate, the benchmark US crude oil, fell the most, losing 47 cents as barrel to settle at $15.23 a barrel on the New York Mercantile Exchange.

Traders said the contract for August delivery, was depressed partly by plentiful inventories of oil at US terminals. The September contract, which is less sensitive to short-term inventories, fell 26 cents a barrel to settle at $15.63 a barrel.

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Cost of north sea oil disaster

The latest, but still very provisional, estimate of the financial cost of the North Sea oil disaster — which has implications for Britain's balance of payments, tax revenue and exchange rate — is being based on a present loss of production of 220,000 to 250,000 barrels a day, according to official sources. But the rate of loss is expected almost to halve within a matter of weeks.

It is being assumed that the large Piper field, where the accident happened on 6 July, will be out of action for a long period, while the five smaller adjacent fields (Claymore, Tartan, Scarpa, Petronella and Highlander) that have been closed down as a precaution should be back on stream as soon as a valve isolating the Piper field can be fitted on the pipeline joining all these fields. This should take no more than two to three weeks, officials believe.

Future of Piper field

Piper accounted for some 8 million tonnes of oil in 1987 out of an annual total North Sea oil production of 123 million tonnes (equivalent to around 2.5 million barrels a day), but it is an old field (opened in 1975) and production has been declining steadily since 1982. It was believed to be providing about 130,000 barrels a day before the accident. The other fields are all much smaller but together account for almost the same level of production.

The future of Piper depends on the operator, Occidental Petroleum, but there appears to be no technical reason why the field should not be reactivated if it is economic to do so. The size of the field would make it surprising if it was not in fact economic.

In the worst case, lost production on an annual basis would, at the current oil price of $ 15.25 a barrel, amount to between £ 3.3 and £ 3.8 million a day, and a little over half of that once the five small fields come back on stream. The cost of replacing the lost oil through imports would thus, again on an annual basis, add around $ 1,200 million to the trade bill.

Small loss to treasury

The effect on the Treasury due to loss of tax revenue is also relatively small. Last year the Government's take from North Sea oil a gas production was £ 4,700 milli (total production accounts for o 2 per cent. of gross national p duct), and the contribution fr Piper is believed to have been ar und £ 300 million.

This is also to be seen in th context of a huge surplus of £ 6,0 to £ 8,000 million on Governme spending this year which indepe dent economists are predicting.

On the insurance side, the Pipe disaster may turn out to be th world's biggest insurance claim The rig was insured for £ 800 million and over half of the risk wa placed with Lloyds on the Londo market. But it is believed that large proportion, perhaps well ove half, has been passed on to othe countries through reinsurance.

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ONGC TO BOOST OUTPUT BY 4 MT

The Oil and Natural Gas Commission (ONGC) is expected to increase production by about fou million tonnes in the next two year (1988-90). While the cumulativ production of oil and oil equivalen of gas (OSG) is expected to go up by 80 per cent in the Seventh Plan as compared to the Sixth Plan, the production in the Eigth Plan is likely to be three times the productio in the Sixth Plan.

According to an ONGC press release, the increase in production is largely due to new oil and gas discoveries, the accelerated build up of reserves and innovative strategies for putting these discoveries into production through the early production system.

ONGC has declared a dividend of Rs. 40.28 crores for 1987-88. This is the highest dividend ever declared by any public sector undertaking in the country and represents a 11.8 per cent increase over the last year's dividend.

ONGC has been top profit earner in the country, with the profit after tax for the year 1987-88 being Rs. 1507.53 crores. This is despite the fact that the price payable to ONGC for its crude oil has remained static since July 1981. The profits have been largely due to increase in efficiency of operations, increase in productivity and deliberate cost control measures. The profits would have been even better if ONGC had received its legitimate dues. A saving of Rs. 143 crores has been ef-

New oil field found in western offshore

ter for petroleum and na- as Brahm Dutt informed rs of the consultative com- of Parliament that a new with a potential to produce million tonnes of oil per year en discovered in the western re.

field named "Neelam" has ged as a single large field from structures — B-131 and B-132 were earlier considered inde- ent.

vering an area of 86 sq. km, the m field is considered as one of most promising fields in the area, minister added.

r. Brahm Dutt said in the east- region, gas had been discovered he Adamtila structure in Karim- district of Assam. Gas from well on this structure, located m. west of Silchar, flowed at rate of 0.6 lakh cubic metres day.

he minister added that the dis- ery has given a new lead to ex- ration in the highly prospective char belt in Assam where, the and Natural Gas Commission had ntified 26 structures for drilling d had deployed five rigs. Four re rigs are expected to be deploy- by the end of the Seventh Plan.

He also informed members that l India Limited had already hieved the Seventh Plan objective establishing geological reserves of 6 million tonnes of oil and oil quivalent of gas in the first three ears of the plan.

This, the minister said, had been ssible through the discovery of ght oil-bearing and one gas bear- g structures, including the promis- g Kumchai structure in Arunachal adesh. Further exploratory acti- ties by OIL in the balance two ears of the plan would add to the ological reserves, Mr. Brahm Dutt lded.

Mr. Brahm Dutt referred to the gning of contracts with foreign oil mpanies for exploration in off- ore blocks and said that with the test production — sharing contract r two blocks in the Kerala-Kon- an basin, eight such contracts in l had been concluded. Negotia- ons for one more block were in ogress.

The minister referred to the re- nt accident in the North Sea where a rig had been destroyed ostensibly due to gas leak and said that taking a cue from the unfortunate occurrence, a safety audit had been ordered for all rigs and platforms as well as refineries as a preventive measure.

He said the Rs. 600 crores gas processing complex of ONGC at Hazira would produce four lakh tonnes of LPG (cooking gas) when it achieves a full throughput of 20 million cubic metres of natural gas. At present, the complex had LPG production capacity of 1.92 lakh tonnes per year.

Increased LPG production, the minister said would contribute to economic growth, help maintain ecological balance by shifting the burden from forests for fuel and would lead to large savings of foreign exchange.

The minister announced that the Hazira-Bijaipur-Jagdispur pipeline, being extended to Delhi to supply gas turbines of Delhi electric supply undertaking, would now also supply gas to a power plant at Dadri and to the fertiliser plant at Panki near Kanpur.

Mr. Brahm Dutt said that the preliminary work in this regard had commenced and the required H-B-J extension was expected to be completed by April, 1989.

OIL SEARCH CONTRACT WITH AMOCO SIGNED

A contract for oil exploration and production in the Krishna-Godavari offshore block, covering an area of about 1500 sq. km, was signed on July 22, by the government with Amoco India Petroleum Company, an American firm.

With this, the government has finalised exploration contracts with foreign oil companies for nine off shore blocks, covering an area of about 1,21,000 sq. km. Earlier, eight contracts were signed.

The Amoco group is engaged in oil and gas exploration and production in more than 30 countries in different parts of the world.

The contract was signed by Mr. Prabir Sengupta, joint secretary in the petroleum ministry on behalf of the government of India Mr. P.K. Chandra, member (exploration) ONGC, and Mr I.W. Herrick, vice-president of Amoco.

According to the terms of the contract, the entire exploration risk- will be borne by Amoco. The company will take seismic surveys and drilling work in a phased programme. If no petroleum is discovered by the exploration efforts of Amoco, it has the option to terminate the contract. All data acquired by Amoco in the block will be available to ONGC.

If petroleum is discovered in commercial quantities, the ONGC has the option to participate 40 per cent in development and production of the discovery. Amoco is required to share crude oil with the government after they have recovered costs. The share will be on a sliding scale.

Amoco's entire share of the crude oil produced from the block will be available to the government at the international market price till India reaches self-sufficiency.

The contract also has provisions enabling the government to enter into separate agreements on transfer of technology, ONGC personnel will be associated with the activities in the block to give them exposure to the exploration techniques used by Amoco.

After signing the contract, Amoco vice-president Herrick said his company proposed to start seismic survey of the offshore basin by October next.

SAFETY AUDIT ORDERED FOR OIL RIGS

A 'safety audit' has been ordered in oil installation in the country, particularly in onshore and offshore drilling rigs, against the backdrop of the July 7 oil disaster in England that left over 170 dead and led to loss of production of 250,000 barrels a day.

The safety audit recommended by the government, will help assess the strengths and weaknesses of the existing safety systems and check the defence preparedness of the staff to cope with emergencies.

The safety audit is at two levels. The first being regular inspection and reporting by the safety officer posted on site which is mandatory in every shift. And the second is the random surprise checks by regional safety officers.

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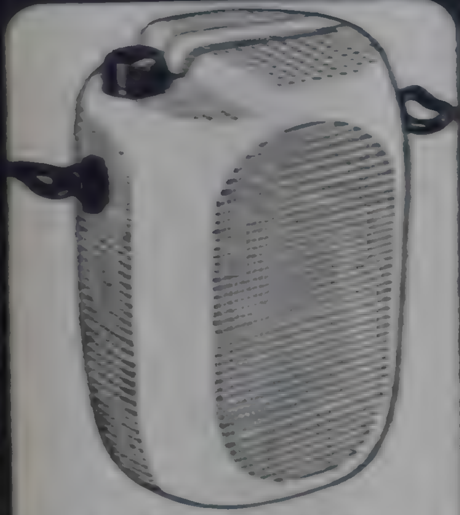

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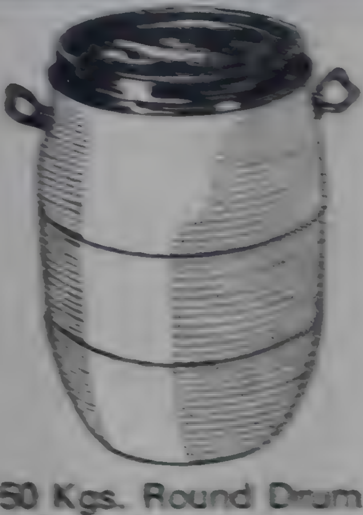

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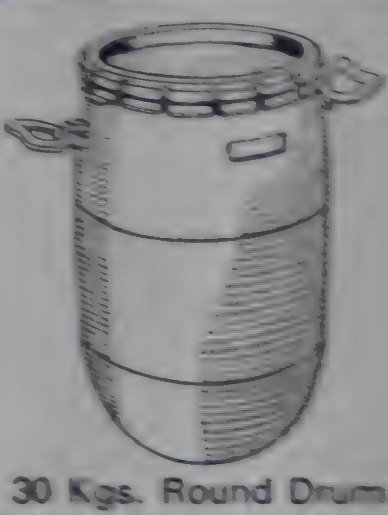

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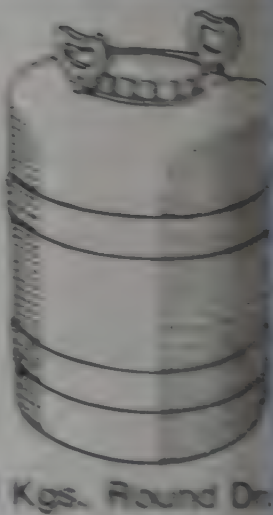

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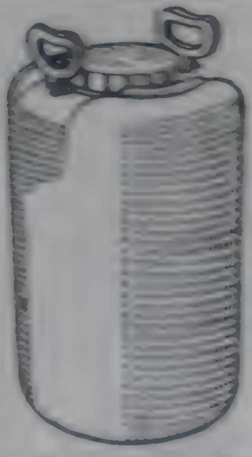

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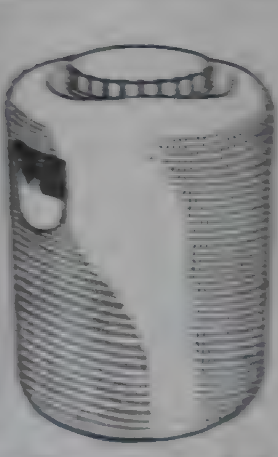

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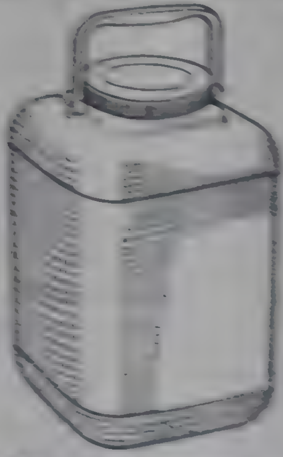

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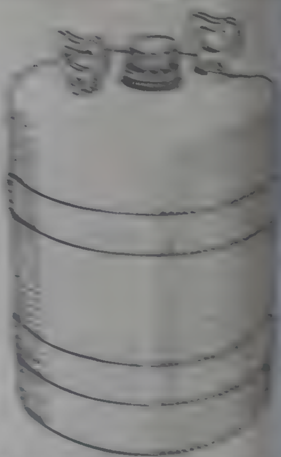

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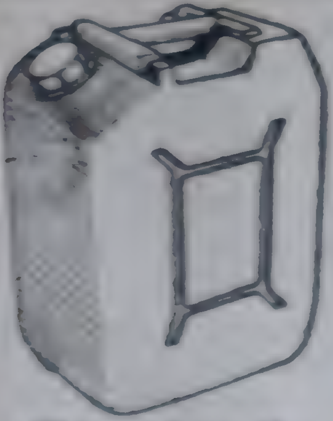

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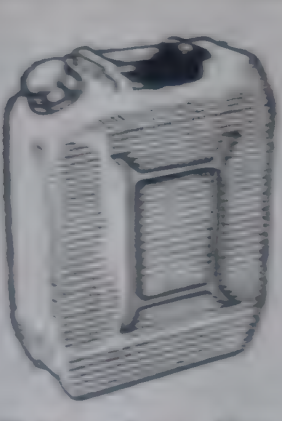

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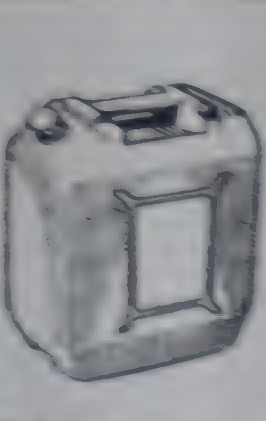

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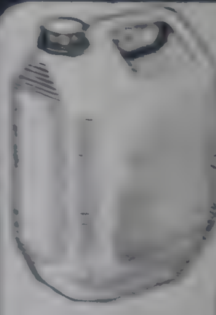

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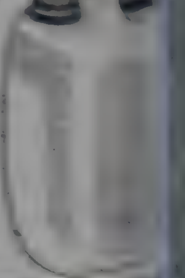

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TURES .

140 proposals under study

and Natural Gas Commission now busy examining about sa's from Indian and foreign for joint ventures relating areas of ONGC operations. sources said in Calcutta 60 have already been awarded for providing services lika seismic, data acquisi- d-logging and the like.

and overseas companies, they showing interest in collabo- with ONGC following the com- accent on indigenisation of its s, Services worth Rs. 309.52 were indigenised during 1986 contrast, it was Rs. 276.32 in 1984-85.

ong the services indigenised are ter and offshore supply vessels d for operations in the high Besides, Indian agencies are handling such services as marine ering, engineering consultancy, of offshore and onshore pipelin- d operation of satellite naviga- system.

a quick estimate, the Commis- s indigenisation efforts have crea- a large number of jobs. Besides, lue terms, in the manufacturing r alone, capabilities and capacity Rs. 100 crores have been put un- way.

lthough full figures for 1987-88 are readily available, it is estimated the complete indigenisation of copter services have resulted in sa- s of Rs. 23 crores in foreign ex- ge. As for the supply vessels, the genisation of its services lead to an annual saving of Rs. crores in foreign exchange.

ccording to the sources, as on ch 31 this year, ONGC's cumula- savings in foreign exchange as a lt of indigenisation stood at Rs. 7 crores.

The foreign exchange outgo in ra- n to Plan expenditure had climbed n from 69 per cent in 1981-82 to per cent in 1986-87.

t is estimated that the domestic in- try is now supplying more than 50 per cent of the oil sector's requirement of equipment and materials like rigs offshore platforms, offshore supply vessels, oil field chemicals and cement.

Meanwhile, the working groups set up in such identified areas as drilling, mud-logging and planning, with representatives from ONGC and the Confederation of Engineering Industry, have worked out a time-bound plan for the development of the indigenous industry. The plan puts a stress, among other things, on identifying new services for indigenisation, developing indigenous capability in line with international standards and developing export potential.

INDIAN RAYON PROJECT

Indian Rayon and Industries has completed its carbon black plant of annual capacity of 20,000 MT at Renukoot, in U.P. with a capital cost of Rs. 40 crores in a record time of 14 months from the receipt of technical know-how package from its technical collaborator and commencement of major civil work.

The plant has started production in July and incorporates the latest high temperature technology of Phillips Petroleum Co., USA. This technology is both input and energy efficient. Detailed engineering of this project was done by Davy Powergas India. The plant is self-sufficient in its power requirement, as it will generate power from off-gases emanating during the manufacturing process. Further, this will bring additional revenue to the company from sale of surplus steam to a nearby customer. This will also help contain pollution caused by the off-gases.

The production of tyres in the country has gone up considerably and tyre industry is projecting a mammoth growth in tyre production in the coming years. This has resulted in increased consumption of carbon black. The demand is also significant from the non-tyre sector. The company, therefore, is confident in marketing its entire production.

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HAZIRA GAS CRACKER COMPLEX :

Reliance gets clearance

Reliance has received the official green signal for setting up a gas cracker complex at Hazira in Gujarat, it is learnt. The company has a letter of intent for putting up a cracker to yield three lakh tonnes, the minimum economic capacity fixed by the Government, of ethylene.

Meanwhile, Reliance has approached the Industrial Credit and Investment Corporation (ICICI) to raise foreign currency loans to the tune of Rs. 84 crores to finance its upcoming petrochemicals project at Hazira.

ICICI is understood to be willing to take up the task subject to participation by the Industrial Development Bank of India (IDBI) and International Finance Corporation (IFC). The financial institutions are to discuss the proposal later this week.

Collaborations have already been lined up for the polyester and plastic raw material projects Reliance Petrochemicals Ltd (RPL) is setting up at Hazira. Once the projects are commissioned, RPL would become the largest petrochemical complex in the country.

Reliance had earlier approached the Government for permission to import ethylene directly with a view to expedite its projects. However, following the world wide squeeze on production it is no longer available for sale in the international market.

Reports suggest that the company is now exploring the feasibility of tapping natural gas liquid (NGL) from the Oil and Natural Gas Commission's gas processing complex commissioned at Hazira last week. Recovery of olefins from NGL is costlier than the gas route.

However, NGL is a richer source of derivatives like paraffins, aromatics and naphthalenes while gas has little else to offer other than ethylene.

A gas cracker at Hazira w
almost a decade ago by th
Government when gas was
in the area. The Governme
into action and set up the
State Petrochemicals Ltd (
applied for letters of intent
a cracker and a host of o
projects.

The company's board of
commissioned Engineers I
(EIL) to prepare a
study. However, the State
ment's ambitions went up
soon after the Ambanis de
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no room for two people to
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onged ONGC strategy to save energy

bring about energy sav- erations, the Oil and Na- mmission (ONGC) has our-pronged strategy for energy audits and conser- of energy.

al energy consumption by stimated at 0.9 billion kwh. primarily two sectors. The includes energy consuming drilling rigs, production such as LPG plants, pro- orms, well-head installations port fleet and workshop fac-

cond sector i.e. the admi- sector comprises the office s, residential colonies and

orate energy audit and con- cell at head quarters, along- rgy cells in each region have up. These energy audit and tion cells are engaged in plan- porting, monitoring and co-or- the energy efficiency and ation programmes.

jor thrust to energy conserva- be effected by resorting to the energy-efficient equipment. Not s, the technological scheme of nts can be so designed as to savings in energy consumption.

ally 30 per cent of input ener- wasted as exhaust losses. At IGC's co-generation plant at he waste heat from the turbine is being used to generate ste- heating of crude oil in the stabilisation units.

to this, boilers were being r this purpose to produce steam 50 tonnes per hour. In the off- production platforms, waste heat e turbine exhaust is being used ating the thermal fluids. The drilling rigs are utilising the heat from engine exhaust for sea water in the water making

wo engines of the rig are mak- tonnes of water per day. As estimate about 220 million of nergy can be tapped in ONGC a view to having a more relia- ce of power supply for its oil installations as well as to effectively utilise the surplus natural gas from the regions, ONGC is installing five captive gas turbine sets of three mw each in Assam at an estimated cost of Rs. 26.03 crores.

At present, the total captive power generated by the commission is of the order of 170 kw. All the five major process platforms at Bombay High have gas turbine generator sets for their power requirement and the total power generated is about 130 mw.

The Uran terminal has two gas turbine sets with 20 mw capacity each. To meet the power requirements of ONGC's gas commissioning complex at Hazira, two gas turbine sets of 19.2 mw each are also being installed. In Gujarat, at Ankleshwar, there is a plan to install two gas turbine sets of three mw each.

Besides, a 13 mw gas turbine is also proposed for the water injection south platform in Bombay offshore. Upon successful commissioning of these proposed schemes the captive power generation is expected to be increased by 72.4 mw.

ONGC is also installing a solar water heating system for the Institute of Petroleum Exploration at Dehradun. The scheme envisages hot water supply of 10,000 litres per day at 60°C. The upcoming hospital complex in Dehradun is going to use solar water heater of 25,000 litres per day capacity.

A similar water heater is also proposed to be provided to Gandhar by the Gujarat Energy Development Authority. In Bombay offshore, the production platforms are generating 3 mwh of energy by using solar photovoltaic cells. There are plans to use the solar photo-voltaic cells for illumination in remote isolated locations and at project workshops for utilising power for the battery charging system.

A plan has also been conceived for successful utilisation of biomass to develop viable, practical and feasible power generation plants for ONGC colonies. To start with, an experimental

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plant is proposed to be set up at the colony in Dehradun. The plant would be able to generate sufficient power to be used for street lighting.

ONGC has also taken initiative to develop and commercialise geo-thermal resources as well. A 1000 kw geo-thermal power plant on pilot scale is also proposed to be set up in the Cambay field.

A major breakthrough has been achieved by ONGC with the installation of 1000 watts wind-driven generator at an unmanned platform in Bombay High. The installed unit is meeting the full load requirement of the unmanned platform with average winds.

ONGC has also undertaken a pilot project in underground coal gasification in Mehsana city area for exploitation through conventional mining techniques. The amount of energy likely to be generated from this source is estimated to be equivalent to around 15,000 billion cubic metres of natural gas.

UAE 'FLOATING' ON OIL

The United Arab Emirates (UAE) has become the world's second largest holder of oil reserves, barring the Communist countries, after Saudi Arabia.

According to the UAE Central Bank Governor, Mr. Abdul Malik Al Hamar, UAE "is floating on oil." Due to discoveries, its oil reserves are now estimated to be three times more than they were three years ago at 92 billion barrels.

He was quoted by the Dubai Daily, 'Khaleej Times', as saying that in 1985 the reserves were estimated at 33 billion barrels.

However, Mr. Abdul Malik said that as recession in the international oil market was expected to continue in the next few years, the UAE would diversify its sources of income and rely on its investments like minerals, agriculture and manufacturing.

According to the latest Central Bank Report, UAE's total exports valued in the last calendar year, at about 12 billion dollars, of which 7.9 billion dollars (66 per cent) accounted for oil sales.

Mr. Abdul Malik said that while hydrocarbons would continue to be the mainstay of the UAE's economy in the near future, dependence on oil would not be sufficient to meet the aspirations of the people.

The UAE could steadily establish a manufacturing base to feed the regional and Arab markets. Economic planning was now essential to formulate short-term plans of about three to five years as well as long-term plans for the next 10 to 25 years, he added.

The country could also be developed as a trading centre, with initiatives from the private sector.

The UAE has already set up a multi-billion dollar petrochemicals industrial city at Ruwais, and proposals for joint ventures to produce fertilisers using its gas resources are underway.

ASTROPHYSICS CENTRE TO BE SET UP IN PUNE

The prestigious inter-university ce tre for astrophysics (IUCA) will be l cated on a eight-hectare plot in th Poona University campus, and is e pected to start functioning from 19 90, according to Maharashtra chi minister Sharad Powar, at a press co ference in Pune recently.

The main objectives of IUCA a to provide a centre of excellence wi in the university sector for teachin research and development in astron my and astrophysics. The centre w not only undertake research program mes on its own, but will also enab teachers and students of various India universities to participate in researc work and execute developmental pr jects.

The centre will also invite profes sors from various universities and giv access to latest instrumentation, da centre, well-equipped electronics lab ratory, excellent library etc.

The Centre has already undertake a project for locating a large radi telescope operating at one-metre wave length band at village Narayangao about 70 km from Pune, under a gian metre-wave radio telescope (GMRT project. The associated offices o GMRT centre will be located on the campus of Pune University. The proposed IUCA will, therefore, get th benefit of telescope and other equipment of GMRT.

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ighlights in Chemical Technology (Part 1)

N: THE COAL AND MENTALLY SAFE FUEL BOOST IN AVIATION

mentalists and engineers t hydrogen would make a fuel than the standard avi- rosene. In its liquid form, packs more energy per an any other non-nuclear burning produces a plume But then one major draw- ncludes cost. Extracting n from water or natural gas ing it to -423°F make the fuel mes more expensive than e.

the interest in the novel fuel en rekindled by news that the have conducted a success- flight of a Tupolev Tu-154 ger jet modified to burn a e of liquid hydrogen and nat- is. The three engine jet which off near Moscow and flew for ns., was the first ever aircraft this new fuel in take-off.

PER-CONDUCTING MIC FILM COATED ON A ON SUBSTRATE ESSFULLY

neral Electric researchers have eded in laying down a super- cting ceramic film on a silicon ate and for the first time gotten ork at temperature as high as

matching of a superconduc- silicon is considered impor- ecause, silicon is "the basic g block of nearly all micro- the Company reports. Previ- ttempts to apply a superconducting yttrium-barium-copper oxide film on silicon or silicon dioxide had failed because, atoms in the two layers inter diffused during the high temperature (850°C) annealing step, destroying the superconductivity. But, yttrium-barium-copper oxide does not become superconducting above 77K unless it is annealed. The researchers solved the dilemma by depositing a buffer layer of heat-resistant zirconium oxide between the silicon substrate and the superconducting film. The buffer serves as an effective diffusion barrier, preventing the elements from intermingling during the annealing process. (*C & EN.*, 3/21/88, p. 17)

A NEW FAMILY OF MOLECULAR SIEVES DEVELOPED

A new family of molecular sieves has been developed at Virginia Polytechnic Institute and State University (Blacksburg) in collaboration with Dow Chemical. Based on aluminophosphates, the new sieves have unusually large pores and the ability to host a variety of adatoms — atoms that are added in, usually for catalytic use.

The most well-known and widely used sieves are the natural and synthetic zeolites — namely aluminosilicates. They are widely used as industrial catalysts and drying agents and for a number of compounding applications. At present the best known zeolite is probably Mobil's ZSM-5, a synthetic material, used to produce gasoline and other motor fuels from methanol, produce lower olefins from methanol and upgrade certain napthas. The most recent addition to the roster of molecular sieves has been the aluminophosphates (alpos), which have the cage and channel structure to zeolites but, with different pore dimension. Pure silica alanogs of some of the zeolites and at least one aluminophosphate also have been synthesized.

The zeolites, some silica polymorphs and the alpos are all composed of tetrahydrally coordinated atoms (T-atoms), with the silicon, aluminium, phosphorus and other atoms connected to adjacent atoms by atomic bridges. Until the discovery of the new sieves by Virginia Polytechnic Institute (VPI) the largest rings in natural and synthetic molecular sieves consisted of 12T-atoms with a free pore diameter available for adsorption at about 10°A.

The researchers at VPI have synthesized molecular sieves with pores larger than 10°A in diameter. Collectively called VPI-5 they are alumino-phosphate-based sieves with 18 membered rings of T-atoms in the same general 3D topology as the more familiar alpos. The framework density of VPI-5 series is 12.7 T-atoms per 1000 cubic °A.

The researchers at VPI have synthesized a growing family of molecular sieves based on VPI-5. These contain a variety of adatoms including silicon and cobalt. At present work is continuing on the confirmation of framework location for these elements.

The total pore volume of VPI-5 is very large. When determined with water adsorbate, the fraction is 0.5 cc water per cc of solid. All other adsorbates have access only to the large pore system and not to any of the smaller pores. Adsorption of oxygen and nitrogen are nearly the same at about 0.25 cc per g., whereas the adsorption of organics is fairly consistent in the range of 0.15 to 0.19 cc per g.

Of particular interest is the adsorption of triisopropylbenzene, which readily adsorbs in VPI-5 and reaches equilibrium in several minutes. Using water and triisopropylbenzene as Pycnometer fluids in VPI-5, the respective densities were determined as 2.56 and 1.64 g per cc. Assuming the total volume of VPI-5 is represented by the water data and that triisopropylbenzene equilibrates only in the large pores, the large pore volume can be estimated at 0.164 cc per g. The kinetic diameter of triisopropylbenzene is 8.5 A. This is the largest molecule used as an adsorbate thus far but there is still room for even larger molecules.

There is some interest in possible use of VPI-5 seives in pharmaceutical applications for purification of large molecules. But, the chief commercial applications would probably be in petroleum refining for cracking very large molecules to increase the motor fuel yields from bottom-of-the-barrel residuals. (C&EN, 3/21/88, pp. 22-24)

AUTO GLASS REFLECTING 94% OF SOLAR HEAT DEVELOPED

Asahi Glass Co of Japan has developed a type of reflective tinted glass for motor vehicles. The new glass is reported to reflect 94% of the heat generated by the sun and is more malleable than other glass.

The product has been used as the roof panel for Honda Motor Co's CRX coupe. Its bending qualities in the [illegible] stage [illegible] it to [illegible] cockpit — an area 4.6 by 3.3. ft in size.

Through magnetron sputtering, an extremely thin layer of titanium alloy is evenly distributed across the glass, ensuring its reflective capacity. Until recently, such sputtering has been limited to relatively small areas because of quality control difficulties. (*Glass Ind.*, 3/1988, p.13)

ALUMINA BEATS ASBESTOS IN INSULATION

Alumina based block insulation has replaced an asbestos-containing material as backing for Sindanyo I 21 mounting boards made by Tenmat Ltd., Manchester (U.K.). The boards are used where graphite busbar terminate at the outer shell of a continuous casting machine furnace. The caster is made by Ruatomead Ltd., Dundee (U.K.).

The insulation's job is to reduce the 1600°C temperature found inside the furnace to about 200°C at the point where the busbar terminal passes through the furnace shell. Excesssive heat could endanger operations as well as damage the synthetic elastomer used to seal busbar ends to the mounting board. (*Ceramic Ind.*, 3/1988, p.18)

THE FIRST FLOAT GLASS PLANT IN INDIA TO BE SET UP BY PILKINGTON

India's first float glass plant, representing an investment of Pound 16 million is to be set up by Pilkington Brothers of U.K. in association with Middle Eastern and Indian partners.

The factory will be sited in U.P. It will have a production capacity of 3,000 tonnes, and is expected to come on stream in 1990. The project is to be operated by Continental Float Glass of [illegible]. It is being promoted by the public sector com-
pany U.P. State Min
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12/1987, p.1)

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4/1988, p.12)

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Ind., 4/1988, p.9)

DRYING FINDS NEW
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lems that freeze drying has in its commercial applications, is being economical.

Its commercial use is just a matter of establishing the right economics, according to Hans Hausner, a professor at the Technical University of Berlin, where research on freeze drying of ceramic has been conducted. In this case, the benefits of freeze drying are worth the expense. One such application is in making a homogenous material for ceramics, including superconductors is getting a uniform composition. To get around the problem researchers can suspend the components of the ceramic in a solvent such as water.

The solution is frozen before the components separate by density. In its frozen state, the mater is in its most orderly arrangement. It is then subjected to a vacuum so that the frozen solvents sublime or pass directly from the solid to the gaseous state. In the case of a superconductor one is left with a homogenous solid of yttrium, barium, and copper oxide.

Thus, freeze drying provides a homogenous, microporous ceramic structure from which gases escape in an orderly fashion, reducing the incidence of fractures. Such a ceramic component can be compacted at lower pressure and it can be sintered at a lower energy saving temperature without fracture.

At the Technical University of Berlin, freeze drying is being used in research to improve the injection moulding of ceramics. Using freeze drying, water is mixed with the ceramic and injected into a die that is cooled below 0°C. The water freezes and is sublimed away more gently by freeze drying. Freeze drying is also finding more uses in chemical processing, for one it can be used to separate solvents and solutes. For example, where there is a single solute suspended in several solvents, the solution could be frozen and then, by varying the temperature and pressure to coincide with each solvent's latent heat of sublimation, that solvents could be collected and isolated on a condenser plate. That kind of separation is the inverse of distillation.

In another application, Oregon Freeze Dry (one of the biggest freeze drying company in U.S.A.) is developing a way to remove water from a water-based latex polymer to render it miscible with other materials. The Company had trouble earlier in dehydrating its polymer. It could not heat the material, which has a low glass transition temperature, without changing its physical properties. Freeze drying, however gave the lowest moisture content.

Another, interesting application of freeze recently developed is in providing effectiveness and extended shelf-life to two types of microbial feed additives produced by Xeroferm Laboratories (Portland, Oregon), probioties and silage inoculants. Probioties are living lactic acid bacteria used in place of antibiotics in feed to correct intestinal bacteria in animals. Silage inoculants are starter cultures of lactic acid bacteria, used to control the rate of fermentation of silage to keep forage from spoiling and shrinking.

Oregon Freeze Dry Inc., has so far freeze-dried more than 400 items and is looking towards additional applications. It reports that within the last two years the number of innovative applications of freeze drying has grown. This is expected to continue, especially as biotech companies come out of R & D and freeze drying becomes a crucial and well established part of their downstream processing. (Chem. Wk., 2/7/88, pp. 42-44)

POLYMERS SPIN INTO OPTICAL COMMUNICATIONS

A new type of optical fibres made from plastic instead of glass looks set to become a commercial reality. The fibres are based on transparent polymers and are made from polymethylmethacrylate (PMMA). Polymer fibres were tried as possible optical carriers in the 1960s, but they could carry light only over short distances before it attenuated too much to be of any use.

Now, Hoechst (West Germany) has solved the attenuation problem by modifying the structure of the polymer. The fibre developed by Hoechst can transmit optical signals over distances of up to 1500 metres. Hoechst expects the fibres to be used for data transmission in vehicles and in computing — particularly in local area networks and possibly in factory automation and on industrial sites. They would be particularly useful in explosives to replace copper wiring which may pick up stray electric currents and damage equipment.

At present, the optical fibres that are beginning to replace copper cables for long distance telecommunications are made from quartz glass. Optical transmissions can carry up to 100 times more information per second than electronic signals in digital form. Fibre optic technology is also cheaper because it requires fewer signal regenarators along the cable.

Polymer fibrees are made using a continuous spinning process. The fibres are 1 mm thick, about 10-times thicker than glass fibres. The plastic fibres are, therefore, much more robust. They are also easier to cut and connect to receivers and transmitters than glass fibres. In the 1960s, Mitsubishi (Japan) took up early polymer work, pioneered by Du Pont and produced polymer fibres commercially. The product never took off, except in a few specialised uses. This was partly because optoelectronics was in its infancy, but mainly because polymer fibres melt at 90°C and are not transparent enough to carry optical signals far. This is because some of the vibrations set up in the carbon-hydrogen bonds which make up the polymer absorb the light as it passes down the fibre.

Hoechst has partially solved this problem by substituting the hydrogen in the polymer with a heavier element, fluorine. Carbo bonds vibrate at lower freq so less visible light is a These compounds also sta at temperature up to 200 recent rapid expansion in the for optoelectronics, and the bility of powerful light emitting based on gallium arsenide o phosphide, have motivated that the time is ripe to polymer-based optical fibre

Hoechst emphasizes because plastics are employed increasingly to bodies, cars no longer h benefit of the metal body to off electro magnetic signa means stray fields from th power cables are much mo to interfere with electronic co cal signals would not be affe their stray electro magnetic and would also be much ligh copper wires.

Hoechst has designed a c controlled fibre optic network operate windows, mirrors, a brakes and provide a dire source for a car's light. H claims that optoelectronic systems will also be far more than conventional control s for cars. (*New Sc.*, 6/2/88,

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Chemical Plant Developments

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Consultant Editor, "Processing", London

ITH A NOVEL

Hunter Filters has devel-
ge of driers called Pneu-
lises a novel concept of
extrusions to form the
g towers. The Domnick
Midi ranges are compact,
nits with simple operation,
the proven principle of
n drying.

ambient conditions and the
compression, air leaving a
sor package is 100% sat-
ith water vapour and also
a large amount of water
and droplets. While these
mechanically separated in
rcooler, the water vapour
in the compressed air.

reduction in temperature
eam will cause it to con-
ut, forming a bulk liquid.
ssed air leaves the after-
t approximately 10°C above
, giving an all year round
n.

the correctly sized drier will
this problem. Pneudri
are made in 13 sizes in the
Midi ranges, with flow rates
litres/s to 76 litres/s at a
ressure of 700 kPa (abso-
ssure of 800 kPa).

Mini and Midi ranges have a
ary external coalescing filter
inal external dust removal
here any fine particles of
dust are removed. Both
n drying towers of extruded
m. The Mini and Midi have
three position directional
valves respectively. In operation of the latter, compressed air is fed in via the external coalescing inlet filter which protects the desiccant from bulk contamination.

Fine Particles Removed

Air enters at the bottom of the drier through the inlet head. The directional control valve in the de-actuated condition allows pressurisation of both column A and column B to the line pressure.

The three position directional control valve, controlled by the pneumatic cam timer, is then actuated to the position that allows column B to remain pressurised and simultaneously depressurises column A. Upon demand, compressed air at line pressure passes upwards through the desiccant bed in column B where water vapour is absorbed before leaving the system through a check valve in the outlet head. The now dried air passes through the external dust removal filter, where any fine particles of desiccant dust are removed.

dominick hunter
PNEUDRI

The Mini/Midi desiccant air drier – winner of a 1986 British Design Award

Within the outlet head the other check valve prevents pressurisation of column A. Simultaneously, a portion of the dried air within the outlet head is expanded back through a calibrated orifice and flows, in reverse direction to drying, down through column A, desorbing the moisture adsorbed in the previous half cycle, and finally exhausts through the directional control valve and silencer.

At the end of the other half cycle the directional control valve is de-actuated and column A is pressurised to line pressure ready for changeover. The three position directional control valve is then actuated to the position that allows column A to remain pressurised while column B is simultaneously depressurised. This condition then remains for the second half cycle. Operation is fully automatic when compressed air is present above the minimum working pressure.

Pneudris occupes up to 60% less space then equivalent driers and are capable of removing particles down to 0.01 um, oil mist to less than 0.01 mg/m^3, oil vapour to less than 0.003 mg/m^3, and will give a pressure dew point of -40°C.

For further details can be had from Domnick Hunter Filters Limited, Durham Place, Birtley, County Durham, United Kingdom, DH3 2SF.

WEIGHTFINDER CONTROLLER

Negretti Automation has introduced the Weighcontroller, a versatile weight finder with digital set point, available as a single or dual channel precision weight indicator or as an indicating batch controller. It is designed to work in conjunction with Negretti's existing range of industrial weighing systems.

The Weighcontroller has eight trip points, fully adjustable by the operator when used as a weight indicator, or recipe controlled when used as a batch controller. In the batch controller mode ten pre-set recipes are possible, each with up to four ingredients. In addition to the trip outputs the Weighcontroller has standard RS232C and RS422 serial communication channels.

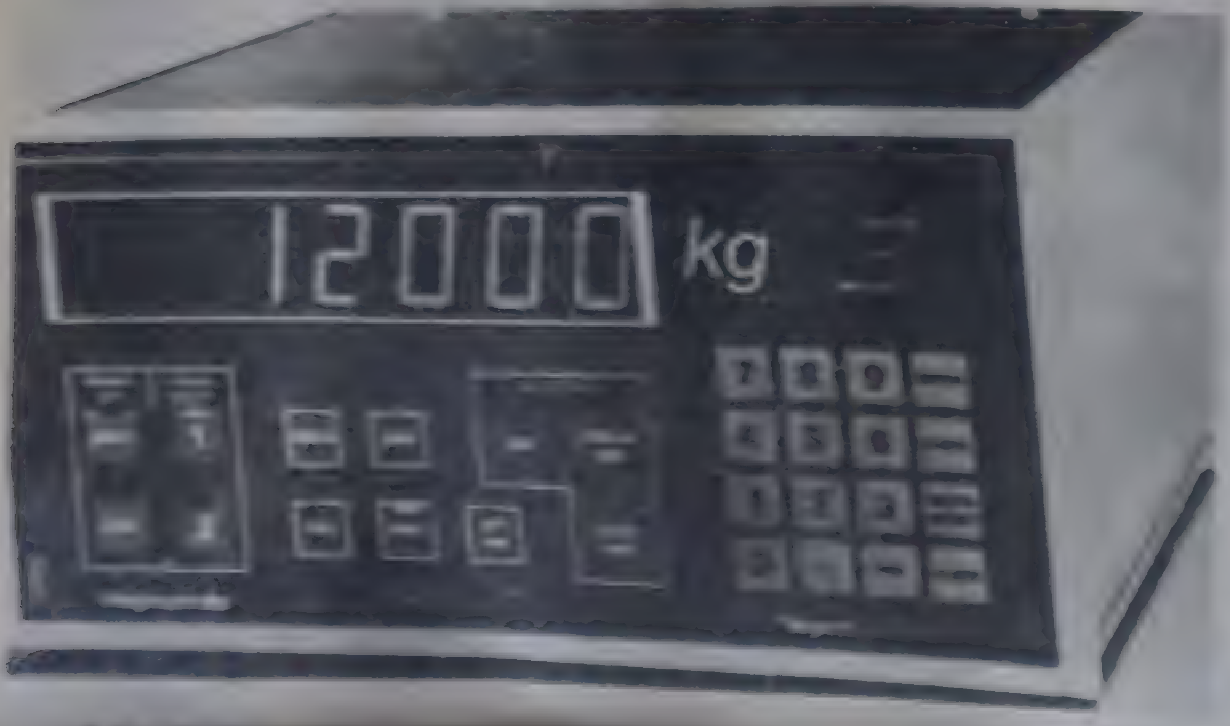
The Weighcontroller may control the batching and blending of up to four ingredients dispensed from the storage silos to the weigh hopper in a typical application. Up to ten recipes containing various mixes of the four ingredients may be stored in the Weighcontroller inventory. The eight trip points are used to control main and trickle feed valves for accurate adherence to the recipe.

In operation load cell excitation is integral for multiple load cell inputs. Eight digital inputs are provided for sequencing. Weight indication is by large easy-to-read 6-digit light emitting diode (LED) display. The front panel contains membrane switch function buttons with status LEDs and a numeric keypad.

The Weighcontroller is housed in a DIN case for panel or bench mounting, 268 mm wide, 142 mm high and 325 mm deep. Standard features include auto-tare, zero tracking, motion detection, on-demand gross or net weight indication, ± ¼ digit indication. Nonlinearity is ± 0.01%.

Other Negretti weighing equipment includes Weighsystem 84, a programmable industrial weighing system for batch process control, the MPC84 and MPC85 process control systems and a useful range of load cells and weighing platforms. Force generators, directly traceable to the United Kingdom's National Physical Laboratory standards are used for the testing and calibration of each load cell.

For Further Details Contact: Negretti Automation Limited, Stocklake, Aylesbury, Bucking
United Kingdom, HP20 1



The Weighcontroller, available as a weight indicator or batch controller

AUTOMATIC VACUUM TRANSFER SYSTEM

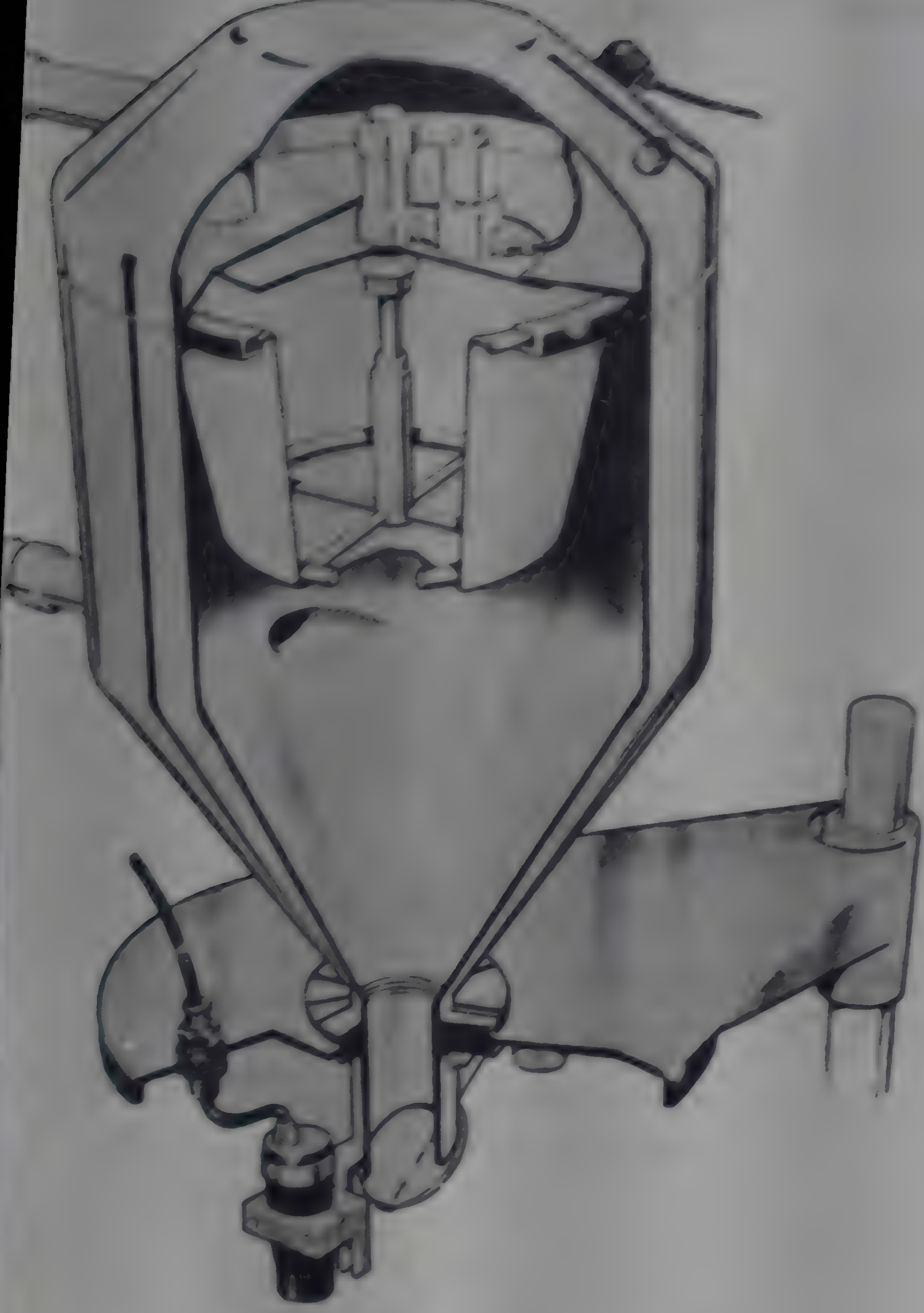
The Autofil Vacuum newly introduced by Machines Limited, hav designed specifically for the transfer of dry solids, pow granules to tablet presses, fillers and high speed mix

The Autofil has already b successfully in conveying t strip and blister packers, and tablet coating machin esty says the system grea ces the amount of airbor improves working conditi vents product segregatio nates the dangers of produ contamination, and avoids t spillages experienced with ling machine hoppers.

The system comprises a panel (single or double unit hopper, entrainment probe a toxic food quality flexible p Autofil hopper has been des stainless steel to meet the s teria and general medical requirements of the pharma industry.

Highly polished, with a ca 21.25 litres, it is fitted with electropneumatic cleaning m ism, a discharge valve and acitance type proximity det can easily be adapted to machines, whether Manest other manufacture.

The control panel houses state programmable contr control the fill and clean c 900 W vacuum fan unit — t double control unit — and for the electropneumatic filte ing mechanism located in th



Cutaway view of the Manesty Autofil hopper

Over-Filling Prevented

In operation, as the vacuum fan unit starts, the discharge valve is closed and the product is drawn up the entrainment probe into the Autofil hopper. After completion of the filling cycle the vacuum fan unit stops and the filter cleaning cycle starts. Material is discharged by gravity from the Autofil hopper to the machine hopper.

The upper product level in the machine hopper is determined by the capacitance type proximity detector which overrides the vacuum fan unit fill cycle. This prevents both over-filling of the machine hopper and hopper starvation by keeping the product level to within a 25 mm band of operation. This narrow band between levels ensures consistency of filling.

The control panel can be floor or wall mounted upto 4 metres from the Autofil hopper, the distance depending upon materials characteristics and pipework layout.

For Further Details Contact: Manesty Machines Limited, Evans Road, Speke, Liverpool, United Kingdom, L24 9LQ.

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Typical uses are telecommunications connecters, coil formers, cases, supports, relay bases, chip carriers. The exceptional ease of moulding in very thin walls permits moulding of low profile electronic components (chip carriers, sockets, casings, switches etc.). Full automatic encapsulation of semi conductors, such as resistors, capacitors, diodes, transistors and integrated circuits.

Automotive

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anti-pollution, gas economiser and pump systems are all using Ryton glass filled compounds.

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Ryton PPS replaces metals and alloys and out-performs many engineering plastics when in contact with hostile chemicals at service temperatures above 200°C. Parts of intricate design in chemical engineering, oil field and other industrial equipment includes pumps, meters, supports, fittings, heat exchangers and scrubbers components, laboratory and dental sterilisation equipments.

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This Ryton PPS is now available for import from Singapore for actual users under Open General Licence.

For further information write to: Vapoor Chemicals, DBS Executive Center, Raheja Chambers, 213 Nariman Point, Bombay 400 021.

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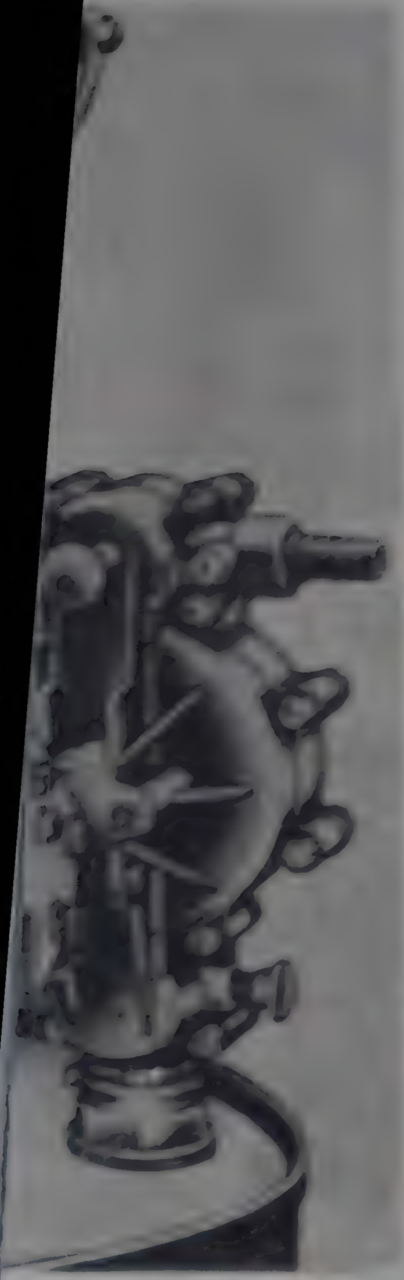

Barrel Pump

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also be used for inorgan-
or ammonia, phosphorus
chloride, all varieties of
organic salt solutions,
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ils and certain organic

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ehydes, ketones, glycols,
petroleum products and
ne and aniline and their
s, benzene, toluene,
d their compounds, liquid
products and pesticides,
, hexane, liquid paraffin
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other acetates, plasticizers, chlorinated solvents, polyols, isocyanates etc.

In general these pumps are claimed to be ideally suitable for transfer of liquid chemicals and oils from barrels and carbouys. They offer suction lift of 3 mts. discharge heads of 15 mts. and capacity of 30 lpm.

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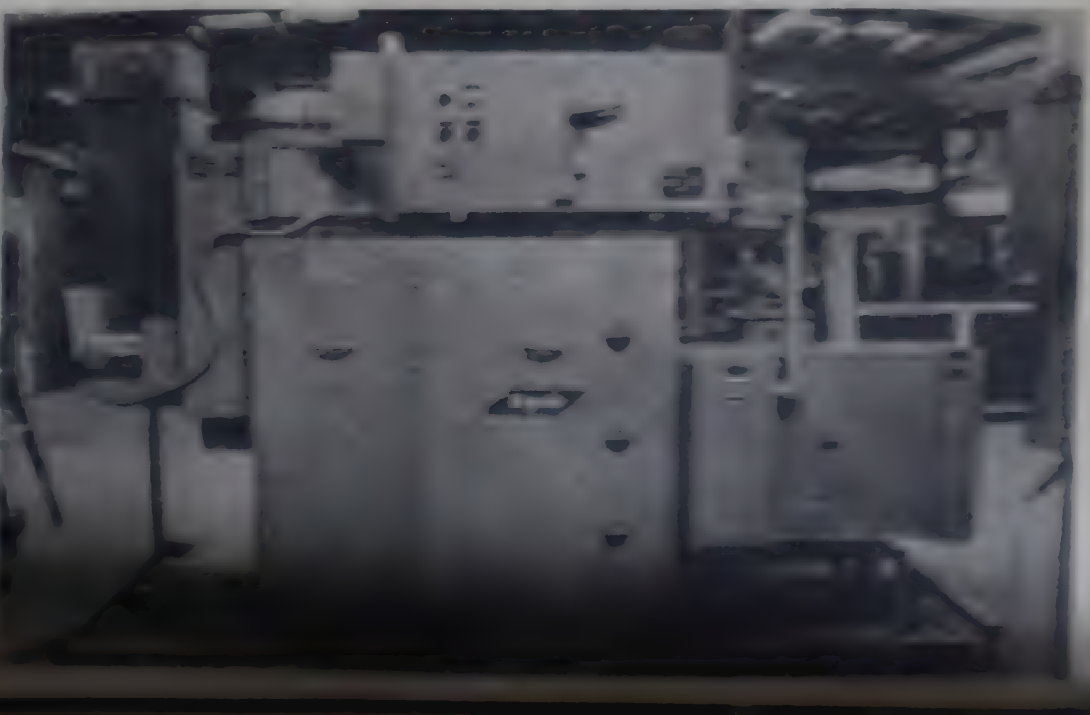
For more details contact: Arctic India Sales, 20, Rajpur Road, Delhi-110 054.



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Chemical News from Abroad

QUIRES DEUTSCHE FOR $1.2 BN

he Texaco AG has been West Germany's largest y producer, Essen-based West-falische Elektrizi- AG (RWE), for $1.2bn. he terms of the long-ex- deal, RWE will acquire r cent of the German bu-

the deal cannot be official- ed until the German fede- tel authority, Bundeskartel- approves the transaction could take several more . A spokesman for Bunde- amt told ECN it is waiting e companies to provide in- ion on their positions in erman markets affected by eal.

he acquisition gets the go- . RWE will boost its chemi- ales with the inclusion of sche Texaco subsidiary Con- Chemie where 1987 turnover timated to be around DM- n. In 1986 the company, h produces fatty alcohols PVC plasticizers, posted pro- of DM26.7m on sales of DM n.

/E's chemicals business is olled through its UK Wessel- subsidiary where products in- e 440,000 ton/year ethylene, 000 ton/year propylene. C_4 ns, 400,000 t/y methanol, onia, urea, 110,000 ton/year and paraxylenes, dimethyl- r and industrial gases. Sales estimated at around DM910 ear.

is believed that the cartel e is less concerned about dea which is not considered ajor player in the German ical industry.

Texaco's German subsidiary operates two refineries at Hamburg and at Heide where it also has an 85,000 ton/year ethylene cracker.

RWE has set up a new subsidiary at Dusseldorf, RWE Mineralol-und Chemie Beteiligungsgesellschaft, to manage its new oil and chemicals division. Statoil, the Norwegian state-controlled petroleum group, is expected to get an oil supply contract for the new business and may also take a financial stake in RWE's oil operations.

RWE, a public company with DM27bn in annual sales, has indicated that it plans to invest more money in restructuring both its existing oil and petrochemical operations and those acquired from Texaco. Subsidiary UK Wesseling has been in the red for a number of years mainly due to its oil interests.

Deutsche Texaco recently announced a 47 per cent decline in net earnings for 1987 to DM93m on net sales 3 per cent lower at DM4.9bn.

SWISS BID FOR ESSEX CHEMICAL

The diversified Swiss group Gurit-Heberlein has launched a $119m bid for control of Essex Chemical of the US. Moves have already been taken by the US company to fend off the bid.

Last week, it alleged the offer violated US federal securities law and was based on non-public information obtained by Gurit-Heberlein through its links with Essex as a joint venture partner.

The Switzerland-based joint venture company, Gurit-Essex,

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manufactures sealants for the automotive industry.

Gurit-Heberlein, which currently owns a 3 per cent stake in the US firm, denies the allegations made by Essex.

The largest part of Essex Chemical's business is in the manufacture of speciality chemicals for the automotive industry. It is also involved in the production of industrial and organic chemicals and pharmaceuticals. Sales in 1987 were $209m while restructuring costs left the company with losses in excess of $16 m.

The Swiss company produces textiles and plastics for the automotive industry. Currently it has no US chemicals base and says the offer for Essex is a strategic move.

Gurit's offer for Essex closes on June 27. Although it is seeking a merger of the two companies, Gurit said it "would live with a 51 per cent stake." The Swiss group reported profits of SF16.4m (11.5m) on sales of SF288m in 1987.

It is understood that the Swiss company has offered to increase its offer of $24/share if Essex agrees to negotiate a friendly merger.

SOLVAY SELLS STAKE IN CCPC

Belgium's Solvay has realized a profit of $100m from the sale of its stake in Corpus Christi Petrochemical Co. (CCPC) to Occidental Petroleum. Occidental acquired Cain Chemical, CCPC's parent company, earlier this year in a deal worth around $2.2bn.

Solvay, together with partners ICI Americas and Union Pacific, sold out of CCPC to Gordon Cain's Sterling Group in 1987 but the Belgian firm paid $15m to retain a stake in the business through its Soltex subsidiary in the US.

Solvay says its contract for supplies of ethylene and propylene from CCPC, believed to run until 1992, will remain unchanged. Soltex is seeking sources for its longer term supply needs.

KENOBEL BUYS FATTY AMINES BUSINESS

Kenobel has acquired Ja Fabrikker's fatty amines bus based at Sandefjord, Nor. The plant, which has sales around Skr70m ($12m), was en over by Norsk Hydro ea this year as part of ex sion plans for its recently-e lished biomarine sector Jahres Fabrikker activities now be concentrated on pro tion of fatty acids and de tives.

Kenobel, a subsidiary of den's Nobel Industries, a lea producer of fatty amines, mainly by the detergents in try. Its current capacity st at about 45,000 ton/year and duction facilities are locate Sweden and Belgium. The a sition of the Sandefjord plant add a further 6-8,000 ton to Kenobel's output, and take total turnover of the ness up to some Skr620m.

Growth of the fatty am sector has slowed to around

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ar. Other major pro urope include Hoe Atochem and Kao panese company in

LL OFF

ace has taken a major rds completing the sale cultural chemicals busi- has signed a letter of the sale for $263m of hate fertilizer operation v. Florida in the US. The a consortium of inves-

ransaction — the biggest date involving the divi- ile, requires government and completion of finan- angements.

facilities still remaining ce's 50 per cent interest our Corners, Florida phos- hine, its nitrogen plant in ard, Oklahoma and the ia complex in Trinidad the company is in partner- th the Trinidad and Toba- ernment. "Except for the d operations, these re- g facilities are expected old by year-end," a Grace ve said.

NVESTS IN UK NG INKS OPERATION

F Coatings and Inks has ced plans to invest a total .5m ($50m) in its UK ink operations. Geoffrey , managing director, des- the move as "the largest nvestment in printing ink ade in the UK." The ex- re forms part of the BASF 's long-term European to establish itself as the ading inks manufacturer 990s.

Watson revealed that the firm's initial investment will include a £20.5m outlay on a new oil ink plant at Slinfold in Sussex. The company already manufactures ink, varnishes, on the Sunford site. BASF's Bartford ink plant will be closed down and most of the workforce relocated to Slinfold, but some redundancies are inevitable, the company said.

The remaining £7m will contribute to a major capital programme to expand BASF's Huyton plant near Liverpool. The Huyton facilities will be converted to the production of liquid ink only.

The investment is aimed at completing the restructuring and integration of BASF's ink business in the UK. It was said that the choice of the Slinfold location is in line with the group's regional policy and will form "part of a very productive network." Watson predicted that with the new Slinfold facility, BASF will have the technology for a "truly European product."

In the printing inks industry the UK now ranks as second largest in Europe, after West Germany. However, Watson emphasized that in recent years, the UK industry had improved its efficiency considerably and was now fast catching up with its German competitor. Work on the new factory at Slinfold and the expansion at Huyton is scheduled to begin in the autumn, for completion by the end of 1990. The Slinfold workforce will be increased from 114 to 240.

BASF has ink sales of more than £30m in the UK. Total UK turnover of the West German group is around £1bn.

COURTAULDS BOOSTS COATINGS

Courtaulds' coating subsidiary International Paint has consolidated its position as the world's leading producer of powder coatings with two new acquisitions in Italy and Spain.

International Paint has made its first move into the Italian powder coatings market with the purchase of an 80 per cent share in La Minerva which has a production facility near Bologna for a range of general industrial powders. The company currently has less than 5 per cent of the Italian market, the world's second largest after the US, but aims to increase its share. Proposals to expand the business are already being formulated according to a spokesman.

In Spain, the company has taken its share of the market to over 20 per cent with the acquisition of Drogasy Suministors. International Paint will transfer its existing Spanish powder coatings operations to the newly acquired facility near Barcelona.

Total value of the two acquisitions is put at less than £12m ($2m). International Paint now reckons to have more than 10 per cent of the total European market. In the US, the company is "gaining ground" having established itself there about two years ago. Expansion plans for its Houston, Texas facility are expected to be announced soon.

The sector as a whole, valued at around $700m, is growing at more than 15 per cent year and is the fastest growing area of the paint industry.

International Paint recently completed an expansion at its UK powder coating facility near Newcastle.

ICI FERTILIZERS RESTRUCTURING

ICI is trimming its UK fertilizer workforce by over 500 and investing in its more efficient plants in a major restructuring move announced recently. The company plans to spend £30m ($54m) on improving efficiency, product quality and capacity at certain nitrogen and compound fertiliser plants.

At the same time the company is closing other facilities, including the older Nitram ammonium nitrate plant at Billingham, Teesside where 50 jobs will be lost. A further 200 jobs will go at Severnside, Bristol, when compound fertilizer and phosphoric acid plants close. The moves will occur in 1989 and 1990.

During 1988, compound fertilizer production at two BritAg Industries at Barton and Beverley, Humberside will close, as will a small Nitram unit and sulphuric acid and phosphoric acid plants at Leith, Scotland. Approximately 140 people at Barton, 60 at Beverley and 90 at Leith will be affected.

The changes will concentrate Nitram production at Severnside and at Billingham. Compound fertilizer production will be centred on Billingham, where production is to be expanded, and at Scottish Agricultural Industries' site at Leith.

ICI Fertilizers managing director, Paul Marsden, said: "ICI clearly intends to maintain its leading market position." He said the restructuring, coupled with new ammonia units coming on stream at Severnside, will give ICI access to the lowest cost fertilizers in the UK. The current programme plus the new Severnside ammonia units will bring ICI's investment in fertilizers to more than £100m since 1985.

The closures and reorga tion will cost £44m in the 19 accounts.

KOCR TO SELL AGROCHEMS STAKE

Israel's Koor Industries is se king partners for its agroche cals subsidiaries Makhtes Agan. Koor plans to divest so of its holding — while reta a majority stake — as part o new reorganization plan. Loss for 1987 are around $180m.

Makhteshim, which is wh owned by Koor, manufactu off-patent insecticides. It ho about 70 per cent of Agan herbicides manufacturer. T turnover of the two agrochemic businesses is estimated at $ m. Output is heavily geared wards the export market. Ob vers consider it unlikely that a foreign multinational would for the operations, so they probably remain in Israeli ha

RCL ACQUISITIONS

Montedison subsidiary which is being renamed A chem, has acquired two com nies involved in the manufac of chemical intermediates the textile and printing industr

Lepitess, based in northern ly, has sales of L10bn ($7 Auschem paid L4.5bn for the siness. It has also brought a per cent-plus stake in Indifar has an option to take full co of the business. Based near lan, Indifar reported profits L1bn in 1987 on sales of L bn.

Auschem, which sold its ricants business to Kuwait roleum for L45bn earl year, has sales of around L in metal working and func fluids and industrial c Further acquisitions are

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Chemical Markets Abroad

ETS EASE AS SHELL NOPCO CRACKER

ethylene market is a sigh of relief with the first of Shell's crackers damaged in an at the Norco refinery brought back on stream. 0,000 ton/year cracker naged after an explosion 0,000 barrel/day catalytic at Norco which provides ck for two ethylene units. aid the cracker has now rought back on stream and g inched back up to full ty.

vever, a smaller 340,000 ar cracker which was clos- the cat cracker and more sively damaged is still clo- and Shell said it would be st another month before a start up date could be given. e two crackers together re- ent 60 per cent of Shell's ethylene output and custom- were put on an immediate 40 cent allocation after the ex- sion, supplied from Shell's 5,000 ton/year cracker at Deer k in Texas. With the resump- n of supplies of ethylene from rco, Shell has been able to rease allocation to 65 per t. Propylene allocation, ich was 60 per cent, has been ped to 80 per cent.

All the units at the nearby che- cal works, which although un- amaged were closed down after e explosion, have also been rought back on stream. The IEK and epichlorchydrin units ave been running for several veeks using stored feedstock. nd the sec butyl alcohol and llyl chloride units have also just en brought up.

Shell has also resumed production of polypropylene at Norco using a combination of stored propylene from its salt storage cavern and imported material. Derivative units at the nearby Geismar site which feed directly from the Norco crackers have also been raised to 65 per cent for production of higher olefins, alcohols and ethylene oxide.

News of the restart will bring some cheer to the ethylene and derivative businesses in the US which have been in some disarray since the outage. A number of Shell's ethylene consumers had to allocate material and they may now be able to improve supplies.

Huntsman, which buys ethylene for styrene production, declared **force majeure** after the Norco explosion and put customers on 40 per cent allocation. That has since been increased to 70 per cent and later 80 per cent after Huntsman procured some extra ethylene.

Fina Oil which operates the CosMar styrene unit with Borg Warner was believed to have put customers on a 55 per cent allocation of styrene. Quantum, which buys ethylene from Norco for polyethylene and VAM production, has put both products on 80 per cent allocation. Allied Signal has also been affected and is allocating polyethylene on a customer by customer basis.

The Norco incident has had considerable ramifications throughout the US chemical industry. Gasoline prices have firmed in the US Gulf with the outage from the cat cracker. Despite the loss of benzene production from the refinery, supply has grown longer because of reduced demand from styrene producers. Even caustic soda markets have firmed, with chloralkali producers forced to turn down plants because of reduced chlorine demand from VCM and EDC producers.

Prices on most products have remained largely stable however, although spot prices of derivatives such as ethyl benzene shot up in the immediate aftermath. The main beneficiary appears to be ethylene oxide which is in short supply anyway. Spot material was moving at around 30 cents/pound before the explosion but recent offers have been as high as 60-70 cents/pound. Shortfalls of other materials produced from Norco such as propylene and butadiene have been compensated for by increased imports, particularly from Europe. However, ethylene has remained very short because of the lack of a suitable import terminal on the Gulf coast. However, despite being in such short supply, prices have not moved up much. June contracts are settling around 28.5-29 cents/pound, only 1 cent/pound above May levels.

OCELOT CONSIDERS METHANOL EXPANSION

Canada's Ocelot Industries should decide by the end of July whether to go ahead with a 15 per cent expansion of its 400,000 ton/year methanol plant at Kitimat in British Columbia.

Only three years ago the plant was threatened with closure when Ocelot came close to bankruptcy, but the recent recovery in the methanol market combined with cuts in production costs and staffing levels has returned the unit to profitability. In addition, Mitsui & Co. signed a two year contract last year to receive 33 per cent of output from the Kitimat plant. Ocelot says the unit is currently operating well above nameplate capacity and produced 508,000 ton of methanol last year.

If the expansion plans are given the green light, nameplate capacity of the unit will be increased to 460,000 ton/year, with completion scheduled for late 1989. The tie-in for the expansion will be completed during a scheduled turn-around at the plant in September.

NEW FINANCE FOR McDERMOTT TRADERS

The petrochemical trading activities of McDermott International now look set to continue under a different name. The group is currently believed to be negotiating credit lines from an Austrian bank and could begin trading by the end of this month.

McDermott's parent decided to pull out of international trading earlier this year and the group has since been winding down operations. The financing deal will involve considerable reorganization of trading activities.

The group's London office has been closed and two olefin traders are believed to be setting up an office in Lisbon if backing is received. Aromatics trading will be carried out at the existing office at Zug in Switzerland.

In the US, the New York office is to close and all trading activity will be carried out at the existing Houston office in Texas. A final decision on the plan is expected by the middle of June.

STOLT PLANS $500M SHARE OFFER

Stolt tankers and Terminals (Holdings), the US shipping and distribution concern, is expected to raise about $500m through a public offering of 6m shares.

The company plans to spend some $10m of the proceeds on capital improvements to its Houston terminal and a further $10m on buying tank containers and developing in-port facilities. Some of the capital will also be used for buying ships, according to the share prospectus lance of the proceeds used for working capit other general corporate pu

Stolt is offering 5m while a further 1m are be fered for the account of Stolt-Nielsen, chairman an executive.

Stolt Tankers and Te has three liquid bulk storag minals in the US and one zil and owns more than tank containers.

NIGERIAN LAB START

The Nigerian National chemical Corp. (NNPC) commissioned a 30,000 to linear alkyl benzene (LAB) at Kaduna. The unit uses te logy licensed from Allied subsidiary UOP.

Production is based on use of kerosene feedstock t vide linear paraffins which then reacted with benzene. month, NPC started up an 1 ton/year toluene hydrodea tion unit at Kaduna which provide benzene feedstock the LAB facility.

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LPG STORAGE, ETHYLENE

Statoil has reached r its Swedish subsi- l Petrokemi, to buy torage cavern from board of economic CB) for SKr25m d convert it to refri- pane storage, provid- ck flexibility for its Stenungsund.

g director Staffan Ri- revealed that Statoil is n ethylene expension sund which would in- pacity of the 365,000 cracker by 10-15 per e company has already environmental permits a new furnace at the

tatoil board is due to er this month to finalize ls of the plan. The ex- is expected to receive go ahead later in the after receipt of environ- pproval and on comple- an engineering study.

The increased availability of propane will give Statoil increased flexibility to switch between naphtha and propane at Stenungsund. In addition, the cavern will provide OCB with a strategic store of material for petrochemical and industrial and domestic heating needs.

Revamping and conversion of the cavern will begin immediately. The cooling process will begin in the first quarter of 1990 with the facility expected to be fully operational by the end of the year. The project will cost SKr130m and Statoil has appointed Johnson Construction as the main contractor.

The cavern will have a propane storage capacity of 265,000 ton, making it the world's biggest rock storage facility. Statoil will rent 60 per cent of the volume to OCB for strategic storage, leaving the remainder for its needs at the Stenungsund cracker and the fast growing inland propane market. Availability of such a large propane facility is expected to make Statoil a much bigger player in the North Sea gas trade.

Riben says there is insufficient existing naphtha capacity in the area to provide for its feedstock needs and he sees the company switching to more intensive propane cracking at Stenungsund.

JAPAN RESTARTS STYRENE UNITS

The lifting of Japan's temporary measures law on styrene is expected to lead to the restart of 180,000 ton/year of mothballed capacity by the beginning of next year.

Although more than 500,000 ton/year of styrene capacity has been closed since Japan's ministry of trade and industry (Miti) introduced temporary measures on the petrochemical industry in 1983, sources believe that at least 280,000 ton of capacity is effectively dead and unlikely to be restarted.

Figures from the Japanese petrochemical association show that styrene production is currently running at over 130 per

Milestone Industries
[illegible]
[illegible]

milestone
IRON POWDER
(REDUCTION GRADE)

milestone

cent of capacity. Last year, production reached 1.56m ton against an estimated total capacity of 1.57m ton, so the restarts should help relieve the pressure on supply.

Mitsubishi Petrochemical is to bring 90.000 ton of mothballed styrene capacity on stream at Yokkaichi in the fourth quarter of this year. This restart will involve the unification of Mitsubishi's 30,000 ton/year No. 2 and 60.000 ton/year No. 3 units at the site.

At the beginning of next year, Idemitsu will restart a 90,000 ton/year unit at Tokuyama.

Only one other producer currently has a plant likely to restart — Asahi Chemical with its 50.000 ton/year unit at Mizushima.

However the company is still to decide whether or not the unit will be brought back on stream. Styrene plants owned by Mitsubishi and Sumitomo are believed to be unlikely to restart. Osaka Styrene's 90,000 ton/year plant at Sakai was closed in 1985.

Further capacity increases are expected in other ethylene derivatives later this year, with Miti due to lift temporary measures on hdPE and vinyl chloride monomer. Measures on hdPE and lldPE were lifted last month.

IMPROVED DEMAND LIFTS US PHOSPHATES

Production of phosphate rock in the US rose by 2 per cent last year to 41m ton, according to annual figures released by the US bureau of mines. The increase was attributed to improved mand for phosphate fer both in the domestic and ex markets.

Consumption increased by per cent to 35.7m ton whilst ports rose by 9 per cent to 8 ton. However, domestic pr continued to come under p sure, with the average unit p in 1987 reported at $19.3 fob mine, 13 per cent lower 1986.

Imports fell slightly to 464 ton, chiefly from the Repub Togo and Morocco although bureau noted that small tonn were also received from c sources, including the UK. US distribution pattern was: ports, 20 per cent, agriculture per cent and industrial prod 7 per cent.

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Environment

N FEARS HIT DSM, FERTILIZER DEAL

imed at reshuffling the assets of DSM of the ds and Finland's Kemi- run aground following government's decision t the levels of heavy me- harge from fertiliser he Dutch waterways mi- regulations for waste ges were always an imp- actor in the swap propo- ich involved UKF Fertili- SM's subsidiary in the SM's 50 per cent stake in nis ammonia and phosph- nts and Kemira's third n the Ucam ammonia plant een. Now that Neelie Smit- minister of waterways and has issued the new res- hs the two companies say re too severe to be met.

from July DSM's cadmium rges may not exceed 1.8 ar, while in 1991 the ma- n level will be 1.2 ton, and 1994, 0.6 ton. Currently, ompany dumps 2.2 ton/year dmium.

mira will be able to meet w regulations for cadmium phosphate will be supplied a mine in the north of Fin- which is low in the heavy . Nevertheless, the govern- restrictions also set maxi- levels for other metals such pper, chromium, nickel and Discharges of these metals halve from their 1935 level 994. Kemira says it can reduce the amount by 35 ent before the costs become itive.

M Mestsoffen has asked the rment to reconsider the new regulations. In the meantime Kemira has decided that it is pointless to continue with the takeover study.

The new heavy metals regulations were based on the outcome of the Rhine-bank states conference which agreed that the discharge of these metals should be reduced by 50 per cent by 1995. Windmill, the other big Dutch fertilizer producer, claims that it can meet the new demands, both for cadmium and other metals. It will have to meet maximum levels of 3.3 ton/year by July, 3 ton/year by 1991 and 0.6 ton by 1994.

NORTH SEA ALGAE BUILD UP

German environmentalists are blaming industrial discharges and communal sewage for the build up of algae in the North Sea. By the end of last month, a blanket of algae had spread several hundred kilometres through Kattegatt, Skagerrak and parts of the Norwegian North Sea as far as Bergen. Biologists say it has caused the deaths of hundreds of fish, as well as baby seals.

The environmentalists have called for an immediate end to discharges of industrial contaminants into the North Sea and the Baltic, in addition to an upgrading of communal sewage treatment facilities so they can remove nitrates and phosphates.

West Germany's federal environmental minister, Klaus Topfer said he would call a special conference of the North Sea border countries if the algae continued to spread.

Meanwhile, Greenpeace in Germany was blockading the North Sea acid dump ship Kronos, which is operated by titanium dioxide producer Kronos Titan at Nordenram. The pressure group planned to keep the ship in dock until a dispute over dumping permits was resolved but ended the blockade unsuccessfully.

In the meantime, Kronos has applied for permission to increase its acid dumping considerably from the 200,000 ton authorized for 1988.

The company has indicated that it is experiencing start up difficulties with its acids recycling plan, which began operation at the beginning of the year at Nordenham.

FREE SLOPS DISPOSAL IN GERMANY

In a move designed to reduce the amount of toxic waste dumped in the North Sea, West Germany has agreed to provide free disposal of waste for all vessels using the country's ports.

The agreement, for which the West German federal government is providing backing to the sum of DM6.75m ($3.97m) a year, will run for a three year trial period.

In an attempt to prevent ships calling at German ports for the sole purpose of disposing wastes free of charge, the authorities are asking for a day's notice prior to a ship docking and only allowing ships making regular port calls to use the facilities.

Whilst the government is assuming half the estimated costs, the sea ports will have to foot the remaining bill. The country's coastal states have been planning a waste disposal initiative for over two years, with the major sticking point being how costs would be met.

Until now the West German ports have provided facilities for disposing of wastes, and charges vessels a fee for using them.

SHOWA DENKO PLANS CFC ALTERNATIVE PILOT PLANT

The Global race for development of chlorofluorocarbon alternatives has entered a new phase with CFC manufacturers developing volume production processes for one of the front running alternatives, HFC-134a.

ICI, the world's second largest CFC producer, has commissioned a pilot plant at its Widnes site which outputs tens of ton quantities of 134a.

In Japan Showa Denko has recently developed a low cost vapour-phase process for volume production of the alternative as well. A facility at its Kawasaki works was used at a test unit and there are now plans to raise the plant's output. The initial target is 5,000 ton/year with the final target at 20,000 ton/year.

Both companies are pinpointing HFC-134a as a replacement for CFC-12, used as a cooling agent in refrigeration and air conditioning applications. Not only are the alternative's thermodynamic characteristics similar to CFC-12, but replacement in cooling systems will require minimum work.

Showa Denko is confident that it will establish production volume before other large producers. HFC-134a production will involve a vapour phase reaction process which is precisely the technology the Japanese firm has been employing in its production of standard CFCs such as CFC-11 or CFC-12.

On the downside, the cost of HFC-134a production will be three to five times more expensive than CFC-12 assuming a plant size of 20,000 ton. But, Showa Denko argues, as the cost of refrigerant relative to total cost of a car air conditioner or a refrigerator is low the higher manufacturing cost will be easily absorbed.

Showa Denko is unlikely to licence out the technology as the cost of HFC-134a greatly depends on plant size. Many small scale plants would result in expensive product, the company said. Showa Denko is one of the smaller CFC producers accounting for 15 per cent of the Japanese market and only 2 per cent of world production.

DUTCH DROP WASTE EXPORT PLAN

Dutch Transport company Van Santen in Moerdijk has scrapped plans for shipment of chemical waste to the Congo in the light of public concern in the Netherlands about Third World dumping. Van Santen had been approached by Bauwerk of Liechtenstein which collects various chemical wastes from the Benelux and West Germany. Bauwerk believed it had agreed with the Congolese government for shipment of 1m ton waste. In fact, the so-called Govt. officials were bogus and last week four people were arrested.

Representatives from Van Santen and Bauverk were due to visit the Congo in July to finalize the contract, and to negotiate construction of an incineration plant there. A delegation from Niger was also to attend.

Although the Dutch overseas development ministry is in principle opposed to waste disposal developing countries, Van San had Dutch environment minis permission, but was afraid o losing other business.

The Congolese government officially denied agreeing to receiv any waste from abroad. According to Dutch environment groups the Liechtenstein company Bauwerk was also planning to shi another 1m ton to the Congo fro the US using Export Waste Management of New Jersey as agents.

The first cargoes of solvents paint residues and pesticide were scheduled for shipmen from California on 11 June wit destination shown as Gorges d Diosso to the north east of Point Noir in the Congo, according t the environment groups. Th Congo was believed to be charging $80/ton.

FLU VIRUS REPORT

Researchers from Harvard un versity and UCLA school of medicine in the US and the UK based National institute for medical research have described the international journal Natur how the influenza virus attache to cells prior to infection. The findings could provide the bas for the rational design of antiv ral drugs.

The scientists have presente an atomic axel to explain ho the flu virus recognizes the cel lar receptor, sialic acid. Inhib tors could be designed to bloc this binding site. This inhibitio is potentially very attractive the inhibitor could be effecti against influenza virus of all su types.

Biotechnology

VEALS FIELD LANS

Genetic Systems (PGS) ian plant biotechnology poised to start the most ıs field testing program- genetically engineered nat have ever been under- PGS plans to conduct 12 ials in five EEC states and . It is collaborating with ndent public institutions in ogramme.

e major objective is to con- ver a wide geographic area nder varying environmental ions, that genetically engi- d crops can give high yiel- nile at the same time red- the amounts of insecticides erbicides normally needed row conventional crops," explains.

Belgium PGS has already ed trials with **Basta**-resistant oes and plans to field test cide-resistat alfalfa this h and resistant poiars in

France trials witn herbicide- tant potatoes and tobacco to be conducted by the In- e national de la recherche omique and Seita. PGS is ng approval from France to trials witn herbicide resist- oilseed rape in September.

e company has filed for ap- al to field test herbicide- tant potatoes in the Nether- s and has already received green light from the UK au- ties to conduct identical in collaboration with the in- e of plant science research. pproval has been granted by Spanish authorities for field to test insect-resistant po- s and herbicide-resistant tomatoes And in the US, PGS has entered into a joint effort with Rohm & Haas and Northup King, the tobacco seed firm, to field test varieties of insect-resistant tobacco.

MONSANTO CONTINUES GENE-SPLICED WORK

Monsanto has started its second year of field tests for tomato plants genetically engineered to resist tobacco mosaic virus (TMV) in Jersey County, Illinois. Results from Monsanto's 1987 field tests showed that plans not only exhibited resistance against TMV but yielded 23-35 per cent more than non-engineered plants innoculated with the virus.

Researchers at Monsanto in collaboration with scientists at the Washington university have inserted the genetic information for the viral protein coat into the tomato plants. The presence of the coat protein in plant cells prevents viral infection.

Monsanto has also field tested tomato plants engineered to tolerate either glyphosate herbicides or caterpillars at the same site in Jersey County. Other tests include two field trials of tomato plants in California and Florida, and glyphosate-tolerant canola varieties at two sites in Canada.

GENENCOR PICKS UP ENZYME PATENT

Genencor, the San Francisco, California-based protein engineering firm, is to be granted a US patent for protein manipulation of the enzyme subtilisin. This is the first patent awarded over enzymes manipulated using recombinant and protein engineering techniques.

Subtilisin is a protein-degrading enzyme with a market worth more than $150m. It is used in cleaning products, in metal recovery, leather treatment and certain food processing applications. Genencor has substituted amino acids in the protein backbone to give the enzyme enhanced properties.

Characteristics of subtilisin modified by Genencor include the catalytic efficiency of the enzyme, substrate specificity, reaction type, chemical stability and enzyme pH optima.

GIST-BROCADES BUYS GERMAN DRUGS FIRM

Gist-Brocades has acquired 100 per cent of the small West German pharmaceutical firm Oxo Chemie, in Heidelberg. This acquisition marks the first step by Gist Brocades towards drugs manufacture in West Germany. The Delft-based company had said previously that it wanted to fill gaps in important European markets.

Oxo Chemie had sales of about DM7.5m (\$4.4m) in 1987 with most coming from its wound treatment product **Oxoferine**. The acquisition of Oxo Chemie will allow Gist Brocades to sell this product in the West German and other markets.

MOGEN SIGNS PACT

Dutch Biotechnology firm Mogen and the university of Leiden have agreed to set up a venture to protect plants against mildew and fungi using gene splicing techniques. Mogen, which focuses on plants biotechnology, is already advanced in protecting plants from viral attack. Field trials have started with gene-spliced potatoes that are protected from the PVX virus.

Protecting plants from fungal attack will be more difficult than viral attack but the potential market is much

Technological Scene Abroad

DEVELOPING PLANTS THAT MAKE NUTRITIONAL OILS

Continental Grain's ContiSeed Div. (New York City) has teamed up with DNA Plant Technology (DNAP) in Cinnaminson, N.J., in a broad programme to develop superior varieties of plants that produce edible oils with health and nutritional benefits. DNAP, which currently is collaborating with Du Pont in the sector, is applying plant biotechnology and other advanced breeding techniques to develop new plant varieties that produce edible oils with improved fatty-acid composition, as well as improved processing and formulation characteristics. Continental's ContiSeed Div. will contribute important germ plasm to the programme, along with its traditional plant-breeding expertise and access to its worldwide field-testing capabilities. Rapeseed, a major edible-oil-producing crop, is a principal focus of work in the programme.

ULTRASOUND DELIVERY OF TRANSDERMAL DRUGS

The development of techniques for the use of ultrasound to deliver drugs transdermally is the aim of an agreement between the Massachusetts Institute of Technology (Cambridge) and Cygnus Research (Redwood, Calif.). Cygnus will have exclusive commercial rights to the technology, which potentially could deliver large-molecular-weight drugs, proteins and antigens into the bloodstream. Research is now focused on delivery through ult- [illegible] physostigmine — previously considered unsuitable for transdermal delivery because of their molecular structures. Future work will involve seven other compounds, including nitroglycerin and a diabetic drug.

AN R&D EFFORT TO MAKE A BETTER BIOINSECTICIDE

Sandoz Crop Protection (Des Plaines, Ill), will step up research and development (R&D) in biological insecticide. The company already makes a line of those products, based on the microbe **Bacillus thuringiensis**, but it hopes to use genetic engineering and other microbiology techniques to develop new biologicals effective against a broad spectrum of pests. As part of the effort, Sandoz says it will expand the company's Wasco, Calif., bioinsecticide plant and will send a small development group from Wasco to Sandoz's Palo Alto research center to form the "core of a significantly enlarged biologicals R&D effort."

APPLIED BIOTECH TO DEVELOP AN IMPROVED VACCINA VACCINE

The vaccinia virus has been used since the 18th century as a vaccine to protect against smallpox, but the virus can cause side effects in some individuals, principally those whose immune system has been suppressed through disease or as a result of chemotherapy, and people with eczema. But now, Applied Biotechnology (Cambridge, Mass.) says it has received a Small Business Innovation Research grant from the National Institutes of Health, which will bolster its effort to develop an improved str- [illegible]

human and vaternary vacc
The company plans eventual
incorporate such an impro
strain into its yet-to-be develo
vaccines, including products a
inst AIDS, leprosy and tuberc
sis, and to license the strain
others. Using recombinant te
niques, the company will iden
the genes responsible for caus
side effects and will modify th
to reduce the risk of those e
cts while retaining the vaccin
effectiveness.

BATTELLE TESTS POLYMER COMPOSITES IN THE SKY

Under contract for the Na
nal Aeronautics and Space Ad
nistration's Office of Commer
Programmes, Battelle research
gineers recently conducted an
periment to understand be
the manufacture of new mat
als in space. NASA pilots w
able to recreate, approximat
the weightlessness of space.
flying parabolic patterns. At
apex of such maneuvers, wh
last about 15 seconds, Batt
engineer Corinne M. Buoni re
sed a catalyst into vibrating v
each containing two liquid mo
mers. During the 15-20 seco
of near weightlessness, the
nomers mixed and cured into
lid multiphase polymers, s
Battelle. "These composite
terial properties cannot be du
cated on earth, because of gr
ty-driven settling or uneven
tribution or mixing of the dif
ent material components,"
Frank J. Jelinek, associate d
tor of the Advanced Mater
Center for the Commercial D
lopment of Space operated
Battelle for NASA. He notes
space production of compos
and other materials offers m
potential for commercial e

News About New Projects

CKS UNIPOL FOR
BIGGEST PP PLANT

ased ISU Chemical
build the world's largest
lene plant at Ulsan, Ko-
200,000 ton/year unit
uled for completion dur-
second quarter of 1990.
Carbide/Shell Oil's Uni-
cess has been chosen for
r economics in both in-
nt and operating costs, its
ty, and its demonstrated
ity to meet ISU Chemical's
polypropylene product
", according to Jean Woon
he company's president.
ant will incorporate the
s largest single train PP
system.

e completed, Bae said it
quickly become an interna-
competitor and leader in
orld PP market."

is marks ISU's first major
cipation in the petrochemi-
business, and the second
PP licensing agreement
rea. The first was agreed
Honam Oil Refinery Co.,
h has just started up its
00 ton/year plant at Yochon
Output in Korea is curren-
nning below capacity becau-
propylene supply problems.
ever, commissioning of new
ers should resolve this by
, when the ISU plant comes
ream.

rrent demand for PP in Ko-
s largely for general-use ho-
lymer grades with speciali-
dom and impact copolymers
nting for only about 10 per
of the market. The trend is
rd more copolymer volume,
ver, in line with Japan and
e where demand for speci-
polypropylene is approaching 40 to 50 per cent of total consumption. Increased demand from the automotive, electric and electronic industries in Korea is raising demand for specialised grades.

CARMEL OLEFINS DEAL CLEARED

Israel's ministry of finance has approved a 50:50 split of Carmel Olefin's shares between Oil Refineries Ltd. of Haifa (ORL) and Israel Petrochemical Enterprises (IPE) despite a re-examination of the deal.

Finance minister Moshe Nissim is believed to have considered a 60:40 split in favour of state-owned ORL because of the relative value of its ethylene plant compared with the polyethylene facility owned IPE — both of which will be run by Carmel: However, a condition of IPE entering into the deal was that it held an equal share in the company. Carmel Olefins is planning to invest an estimated $100m in doubling capacity of both the ethylene and polyethylene facilities to 200,000 ton/year.

Meanwhile, in line with the current privatisation mood in Israel, government economic ministers overruled attempts by ORL to take up an option to purchase 52 per cent of shares in Gadot Petrochemical Industries.

Ownership will now be Delek, Clal and ORL with 26 per cent each with the Johananoff Broth ers retaining 19 per cent in line with an earlier deal.

BASF EXPANDS IN BRAZIL

BASF has announced plans to spend $240m in Brazil over the next three years. Around 70 per cent will go on new asset Already under construction a Manaus in the Amazon region i a plant to produce expandabl polystyrene foam sold under th trademark Isopor. Another in vestment at the location is fo audio-visual cassettes.

Paints subsidiary, Glasurit do Brasil plans to build two new plants for binding agents and solvents-based paints at Sao Paolo and Bernardo do Campo.

Investment plans for the Guaratingueta production site include expansion of dispersions, pigments and auxiliaries, along with the construction of a waste incineration plant.

BASF had sales of Crc25.3bn ($610m) in Brazil in 1987.

FRENCH PEROXIDE UNIT IN VENEZUELA

France's Atochem and L'Air Liquide, through their equally-owned subsidiary, Oxysynthese, have signed a deal with Venoco, Proquim, and Sulfatos del Orinoco to build a hydrogen peroxide plant in Venezuela.

The unit will have an initial capacity of 20,000 ton/year, primarily destined for the Venezuelan market and the countries of the Andean pact. The region will soon experience a boost in demand for H_2O_2 when pulp and paper mills based on plantations in the states of Monagas and Anzoategui, start operating.

The unit will be based on the Oxy-synthese process already used by the partners at Jarrie in France, Tomakoman in Japan and Becancour in Quebec, Canada. Venoco and Proquim are both Venezuelan concerns, while Sulfatos del Orinoco is owned 25 per cent by Corporacion Venezolena de Guyana.

Hydrogen peroxide is used in the paper, chemical and textile industries. Demand for the chemical in South America is said to have grown 15 per cent from 1983-1987, against 9 per cent in Western Europe, 10 per cent in North America, 3 per cent in Japan, 14 per cent in South East Asia and 24 per cent in Australia. In South America, Interox has production in Brazil, while Argentina's Atanor is expanding its plant.

SULPHURIC ACID HIKE IN CANADA

Westcoast Transmission Co. Ltd. of Vancouver, Canada is expanding facilities at its Prince George, BC, plant, which currently produces sulphuric acid and aluminium sulphate. Sulphuric acid capacity is to be expanded from 35,000 ton/year to 45,000 ton/year and a new 30,000 ton/year liquid sulphur dioxide plant will be installed. Capital cost of the project is Can$8m ($6.6m). Construction will begin in July with start-up slated for the end 1988. Chemetics International has been selected as main contractor.

CIL will market the product which will mainly go to North West Canada. The major end use is the pulp and paper industry.

PROCESSING WASTE SULPHURIC ACID FROM TITANIUM DIOXIDE PRODUCTION

The Federal Republic of Germany's biggest producer of titanium dioxide — Kronos Titan GmbH — has now commissioned a plant for processing waste sulphuric acid in its Nordenham works.

Results obtained from development work were put to use in the evaporation and crystallization plant supplied by Sulzer Escher Wyss (Zurich and Ravensburg). The "Kronos Process", now industrially exploited, was developed using a jointly-operated pilot plant. Choice of material and design for the [illegible] concentration and purifica stages of the process are fu fruits of development ef which began as long ago as early 1970s.

DU PONT WILL MARKET TH FIRST AUTOMATED AIDS TEST

Du Pont will market this s mer the first diagnostic sys that automates the test for c firming AIDS. Known as W Blot, the system, developed Bionetics (Hayward, Calif.), tually eliminates the potential human error in performing Western blot, the test used rule out the presence of A antibodies. Last year, 10% about 500,000 Western blot t conducted produced question results, with the problem lai operator error and faulty test terials. The new automated s tem, moreover, could ease w is now 2-4 weeks delays in taining confirmatory results w AIDS testing.

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R&D promotion system
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drastically reform the
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ouncil envisages beefing
system with emphasis
the following three

TI will attach greater im-
to basic fundamental
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aimed at ensuring the
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to escape from criticism
reign countries, who are
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n technology developed
ign countries.

TI will further promote
tion with universities in
esearch. It will establish
R&D system, in which uni-
researchers will easily be
participate.

TI will push forward co-
e research with overseas
ses and laboratories. (It
eady invited foreign com-
to join a superconductive
n project now under way).
said R&D system was es-
d in fiscal 1981 with the
[illegible]

fundamental industrial technology. It has served to boost Japanese technology to the international level.

M'BISHI CHEMICAL BUILDS AROMATIC ALDEHYDE PLANT

Mitsubishi Chemical Industries Ltd., has constructed a multi-purpose plant for producing aromatic aldehydes at its Kurosaki factory. The plant uses the world's first zirconia catalyst developed by means of the company's own know-now and recently started production on a full scale.

The new catalyst is a high-activity reductive catalyst using zirconium oxide as main ingredient and produces aromatic aldehydes from aromatic carboxylic acid by means of the direct reduction process. The yield rate of the aromatic aldehyde produced is high and their purity is more than 99.9%. The new catalyst can reduce manufacturing costs by 20-30% compared with conventional ones.

The new plant will produce m-phenoxybenzaldehyde as intermediate for pyrethroid-based agrochemicals and p-tert-butylbenzaldehyde and p-methylbenzaldehyde as intermediates for pharmaceuticals, agrochemicals, and flavours and fragrances at the rate of 1,000-1,500 tons a year.

The company intends to manufacture other aromatic aldehydes, higher fatty acid aldehydes and ketone derivatives in future and regards the plant as the centerpiece of its organic fine [illegible]

PETROCHEMICAL PLANTS IN TROUBLE ONE AFTER ANOTHER

An extraordinarily large number of large-scale chemical plants located in advanced countries have been in trouble one after the other since the turn of this year. More than 20 chemical companies including three Japanese ethylene producers were forced to stop plant operations, though the periods of plant suspension were less than a week in many cases.

The major reasons for plant troubles are extremely high plant operation rates and superannuation of production facilities. Chemical plants often developed troubles when their operation was resumed after regular plant check-ups. Plant troubles involved compressors, electric circuits, crackers, turbines and gas leaks, etc.

Shell (U.S.)'s and SADAF (Saudi Arabia)'s ethylene plants and Hoechst Celanese (U.S.)'s acetic-acid plant are still in suspension.

The supply-demand situation for petrochemicals has been tight throughout the world due to business pick-ups in the U.S., stabilization of crude oil prices and restrictions on plant-and-equipment investment. Successive plant troubles have made the petrochemicals shortage more critical.

Fortunately, Japan's petrochemical industry has not been involved in large-scale plant troubles, demonstrating a high level of maintenance technology. It seems that the industry needs to carry out periodic plant repairs in a cautious manner and refrain itself from operating plants at high rates.

TIO$_2$ SUPPLY-DEMAND POSITION WILL BE TIGHTER THIS YEAR

It is certain that the supply-demand position of titanium dioxide in Japan will become tighter in fiscal 1988 than in the preceding fiscal year because growth has been faster than predicted earlier.

The latest prediction for FY 88 by a makers' association shows a 1.9% rise in domestic deliveries and a 4.4% gain in exports, or 260,300 tons of deliveries in total. This means that domestic and export demand can be satisfied if all the plants are run almost full out, but many observers see demand this year growing at a faster pace, particularly in Southeast Asia — the main destination of Japanese titanium dioxide.

In FY 87 Japanese suppliers managed to meet domestic needs by cutting supplies to overseas countries and by raising production efficiency. They feel it difficult to make more efforts this year than they did last year.

It is believed that the current tight market position will become even worse before the operation start-up of Ishihara Sangyo's new plant in Singapore which is scheduled for next February.

3-5% ANNUAL GROWTH TO CONTINUE FOR MMA MONOMER DEMAND

Japan Methyl Methacrylate Resin Association has compiled a long-term demand estimate for methylmethacrylate (MMA)-related products for the 5 years starting from 1988. According to the estimate, demand for MMA [illegible]

and 3% in 1990 and every year after that. In 1992 the figure is expected to reach 336,660 tons. In and after 1989, domestic demand is expected to be steady, whereas growth will be slow due to increased imports. With the existing production capacity of about 345,700 tons a year, plant operation will be high at the rate of 9.7% or more in 1992, consequently forcing manufacturers into plant expansion.

The association reports that demand in 1987 for MMA Monomer registered 284,154 tons, a 14% gain over the preceding year.

In terms of polymer, demand for molding materials recorded only a 4% increase with regard to use for motor vehicles, its main outlet, and only a 3% increase in the case of electrical machinery which was pressured by imports from Southeast Asia. Exports to South Korea and Taiwan where demand is growing at a high pace, increased by as much as 17% over the previous year. As a result, demand growth in total achieved a 6% increase.

Domestic demand for monomer showed a double-digit increase centered on paint and coating uses. Exports scored an unexpected increase of 46%.

JAPAN-BELGIAN PHOTO CURING RESIN COMPANY ESTABLISHED

Daicel Chemical Industries Ltd. recently established Daicel UCB Ltd. jointly with UCB SA (Belgium). The joint company is scheduled to exclusively import ultraviolet ray electron beam-curing resins from the Belgian company [illegible]

joint company aims at fu
panding the domestic ma
starting producing the sa
at Daicel's Ohtake factory
years hence. UCB is
largest producer of the re

Photo-curing resins
the abovementioned
used in the forms of prin
surface-coating materials
film and coatings for
resin, etc. They have co
ble commercial potentia

The joint company has
ed from the fact that th
ests of UCB and Daicel
cal Industries dovetail: th
er is planning to establish
duction base in the Far E
the latter is emphasizing
ty chemicals operations.

SHOWA DENKO DEVELO CFC SUBSTITUTE PRODUCTION METHOD

Showa Denko K.K. ann
the development of a pro
mass-produce a promising
native to chlorofluoro
(CFC)-12, a chemical
blamed for destroying th
layer around the earth. S
of the alternative, tetrafluo
(HFC 134A), are being d
ted.

Du Pont of the U.S. an
the development of a
production process for
134A. Showa Denko is th
Japanese company to dev
HFC-134A mass-production
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saving vapor-phase type.

The company now ha
HFC-134A commercial-sca
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compound per month. The
[illegible]

w Developments from Japan

TRANSPARENT
SSFULLY

hemical Industries
loped KR-610 rosin
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T APPLICABLE
ES SELLING WELL

tribution of paddy-field
licable herbicides has
ging considerably be-
four herbicides of this
ed to DPX-84 and mar-
year are growing ra-
ough this year is sub-
the initial one for them.
ther hand, demand for
herbicides is showing
growth.
growth of the herbicides
since the 1982 pesticide
[illegible]

bined are expected to increase by about 10%.

Appearance of new herbicides has changed the structure of the herbicides market. Deliveries of paddy-field 1-shot-applicable herbicides in terms of volume till now will show trend of agrochemical deliveries. Agrochemical manufacturers are rather puzzled by the unexpected trend. The trend from now on will attract the attention of the parties concerned. Sankyo Company Ltd.'s Kusakarin marketed in 1982 was the first 1-shot applicable herbicide. Only 7 years have passed since the 1-shot-applicable herbicides market was established. However, herbicides of this kind have grown rapidly and in terms of value they now account for 40% of all paddy-field herbicides.

The rapid growth is attributed to the fact that this type of herbicide promotes efficiency and labour-saving on farms and reduces herbicide-application volume and frequency. Demand for all other agrochemicals is showing low growth rates or negative growth and only 1-shot-applicable herbicides are showing a high growth rate. Last pesticide year the new herbicides are said to have accounted for about 44% (940,000 hectares) of paddy field area.

According to those concerned in the agrochemical industry, this pesticide year they are expected to increase by about 10% to 50% (1,000,000 hectares) of paddy-field area.

Up until now Kusakarin has dominated other 1-shot-applicable herbicides and it once gained a share of nearly [illegible] of the market for 1-shot-applicable herbicides. Kusakarin application hit a peak last pesticide year when its application area was estimated to have been 540,000 hectares, far surpassing 18 other 1-shot-applicable herbicides such as [illegible] ranking second.

At present, however, strong competitors have appeared. They are Wolf, Zark, Push and Gurbo. All of them are mixtures using Bensulfuron-methyl (DPX 84) developed by E.I. du pont de Nemours & Co. (US). They were in the limelight before being marketed because their application period is long and they can produce a large effect by means of only an ultrasmall volume of active ingredient. Last year sales bases were being established and this year the four newcomers will be delivered in large quantities.

NEW TYPE OF ANTIULCER AGENT TO UNDERGO CLINICAL TESTING

Nippon Chemiphar Co. will soon undertake clinical tests on a new type of antiulcer agent which works both as a histamine H_2 receptor antagonist and as a potentiator of mucosal defensive factors. The agent coded as "NC-1300" is expected to be a big-seller item when marketed.

In recent years main antiulcer agents have been rapidly shifting from the latter type — often called "defensive" type — to the former type — called "aggressive" type. Some H_2 blockers (aggressive type) now available have recorded annual sales of the order of Y 10 billion.

NC-1300 was jointly developed by Nippon Chemiphar and Kyoto College of Pharmacy. The company hopes the new item will be accepted as a next generation antiulcer drug following H_2 blockers.

HIGH-PURITY APATITE HYDROXIDE SUCCESSFULLY PRODUCED

Sekisui Plastics Co. has established technology for producing high-purity apatite hydroxide using a unique wet-type synthesis process and transforming the product into ultrafine amorphous particles. The company claims it is possible to produce 99%-purity apatite hydroxide by means of the new technology, which is capable of lowering the tricalcium phosphate (TCP) content to below 10%. The TCP content is markedly high when a conventional production method is employed.

Apatite hydroxide is used as a filler for cosmetics and bioceramic material for artificial bones and teeth roots. In addition, it is being increasingly employed as adsorbents due to its porous structure.

It physically adsorbs organic acids such as amino acid and fatty acid and chemically does so with water vapour, carbon dioxide gas and other gases. It adsorbs gas in proportion to the latter's concentration but in the case of low-purity apatite hydroxide there is no exact proportion between gas adsorption and concentration.

The company is conducting research aimed at developing a gas sensor using the high-purity product in co-operation with a university researcher. The physical properties of the high porous apatite hydroxide specific gravity, 3.16 sp surface, below 65m g size, 40 microns and center ticle-diameter, 9-10 micron

LOW-COST PEO-ACID PRODUCTION METHOD ESTABLISHED: KAWAKEN

Kawaken Fine Chemicals has established a low-pres vapour-phase continuous tion process designed to sy size high-quality polyoxyeth diglycollic acid (PEO acid low cost using inhouse-deve precious-metal catalysts.

The company is buildin 200-kg m pilot plant in a bi start sample deliveries in Sep ber on a full scale. It plan construct a 5-t/m comm plant within one or two y depending on actual de trends.

The targeted PEO acid is lable in two types — con (purity: over 97.0%) and purity (over 99.5%) gr Common-grade products used as additives to polyester polyamide, cross-linking ag electrolytic solution for minum-electrolytic capac enzyme modifiers and carrier artificial blood. High-purity ducts will also be used in forms of biomaterials — car for insulin and hemoglobin, example — and ultrahigh pe mance electronics materials well. They are priced at Y and Y10.000 kg, respectively

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KET INFORMATION

Titanium Move up

crease of Rs. 5/- in the titanium dioxide by the The market exhibited rm. The rate quoted was /-. The basic solvents xylene and toluene were They were quoted at Rs. 8/- and Rs. 14/- respectively. Butyl acrylate, which eased during last fortnight, shot up by Rs. 8/- to Rs. 88/-. Sodium alginate also moved up to Rs. 150/- owing to shortage of ready goods.

In the dyes section, BON acid rose Rs. 114/-. All aniline based intermediates were costly because of recent increase in aniline price by HOC. Exports of dyes were satisfactory.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent — and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on 21st July 1988)

. CHEMICALS	Per kg
sulphate	2.00
phosphate (Mono)	14.50
phosphate (Di)	12.00
carbonate (Di)	17.00
bicarbonate	4.75
chloride	3.00
nitrate	3.50
te powder	21.00
(Resale)	60.00
bonate	6.00
powder (33% Cl)	4.00

Borax (Granular)	13.50
Borax (Powder)	20.00
Boric acid (Tech.)	21.00
Bisphenol-A	68-ST
Butyl carbitol	48.00
Caustic soda (Flakes)	9.25
Caustic soda (Solid)	8.00
Caustic soda (Lye)	7.00
Calcium chloride 70% (solid)	3.25
Calcium chloride 75-80% (fused)	3.50
Calcium chloride 38% (Anhydrous)	5.00

Calcium Carbonate PPT	3.00
Calcium carbonate (Activated)	3.55
Camphor (Indian)	62.00
Cresylic acid	58.00
Cream of Tartar (Tech.)	78.00
Citric acid (Belgium) (Resale)	43.00
Citric acid (Indian) (Resale)	42.50
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Litharge	15.00
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Lithopone	15.50+ST
Magnesium chloride (Crystal)	1.00
Menthol crystal (Flakes)	185+EX.+ST
Menthol bold	205+Ex.+ST
Menthol crystal bold	245+Ex.+ST
Magnesium carbonate (Japan)	16.00
Magnesium carbonate (Indian)	15.00
Maleic Anhydride (per kg)	(Resale) 48+ST
Mercury (75 lbs.)	10500.00
Nickel chloride	90.00
Oxalic acid	(Resale) 22.00
Peppermint oil (Rectified)	90+Ex.+ST
Potassium carbonate (Indian)	19.00
Potassium carbonate (Imported)	21.00
Potassium bichromate	22.00
Potassium phosphate (Mono)	14.00
Potassium phosphate (Di)	14.00
Polyvinyl alcohol (No. 117)	120+ST
Polyvinyl alcohol (No. 173)	(Resale) 130.00
Polyvinyl alcohol (No. 208)	115.00
Paraformaldehyde (Resale)	20+ST
Phthalic anhydride 36%	(Resale) 24.00
Pentaerythritol	(Resale) 51.00
Paraffin wax	(Resale) 14.50
Rangolite (German)	80+ST
Rangolite (Czech.)	54+ST
Sodium sulphate (Fine)	6.00
Sodium sulphate (Coarse)	5.00
Sodium sulphide 50-52% (Flakes)	8.00
Sodium sulphide 58-60% (Flakes) (TCL)	21.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite	(Resale) 800.00
Sodium chlorite 80% (Spain)	90.00
Santobrite (Indian)	36.00
Soda Ash (Tata)	4.00
Soda Ash (Birla)	3.80
Soda Ash (Imp.)	3.50
Sodium bicarbonate	5.25
Sodium bisulphite	4.50
Sodium silicate	3.00
Sodium acetate	6.00
Sodium alginate	150+ST
Titanium Dioxide (Anatase)	50+ST
Titanium Dioxide (Rutile — RCR$_2$)	70+ST
Tartaric acid (Crystal)	94.00
Trisodium phosphate	4.80
Thiourea	74+ST
Urea (Tech)	2.75
Zinc Dust	30.00
Vacuum salt	1.00
Zinc Oxide	30.00
Zinc chloride powder (technical)	14.00
Zinc sulphate	4.00

SOLVENTS	Per kg.
Acetic Acid (Glacial)	(Resale) 14.50
Acetic Anhydride	(Resale) 25.00
Acetone	(Resale) 15.00
Adipic Acid	52+ST
Aceto Acetanilide	50.00
Aniline Oil	(Resale) 50.00
Benzoate Plasticiser	45.00
Butyl acrylate	88+ST
Butyl stearate	36.00
Butanol	(Resale) 34.00
Benzyl Alcohol	60.00
Benzyl chloride	34.00
Benzo trichloride	16.00
Benzoyl chloride	22.00
Bromine Liquid	42.50
Chloroform	25.00
Carbon Tetrachloride	16.00
Cellosolve	45+ST
Cyclohexanone	53+ST
Cyclohexanol	43+ST
Diacetone	(Resale) 35.00
Diethyl Oxalate	34.00
Diethylene glycol (DEG)	45+ST
Dioctyl Phthalate	52.00
Diallyl Phthalate	56.00
Dimethyl Phthalate	28.00
Dioctyl Adipate	52.00
Dibutyl Adipate	42.00
Dipentene	15.00
Dimethylamine 40%	12.00
Dimethylamine 60%	14.00
Ethyl Acetate	21.00
Ethyl Acrylate	49.00
Ethylene Dichloride	11.00
Ethylene Glycol	41+ST
Formic Acid (Imp)	(Resale) 29.00
Formaldehyde	(Resale) 6.00
Glycerine (CP)	53.00
Glycerine (IW)	48.00
Hydrogen peroxide 50%	(Resale) 29.00
Isopropyl Alcohol	17.50
Iso Butyl Alcohol	28.00
	(Resale) 30.00
Monoethanolamine	(Resale) 49.00
Melamine	60+ST
Methyl Ethyl Ketone	55.00
Methyl Isobutyl Ketone	36.00
Methyl Acrylate	42.00
Methyl Dichloride (Resale)	23.00

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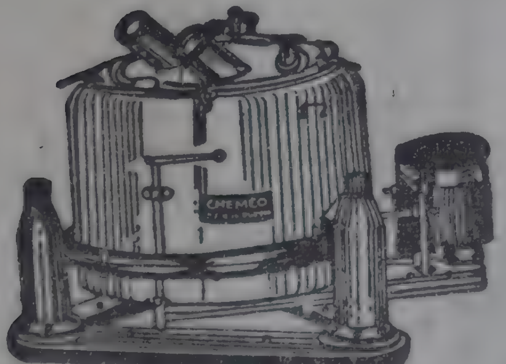

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Meta Cresol	45.00
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Para Cresol	40.00
Styrene monomer	50+ST
Sorbitol	16.50
Sulphuric Acid	2.10
Trichloroethylene	27.00
Triethanolamine (Resale)	49.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	11.75
Triethylamine	50.00
Vinyl Acetate Monomer	43.30

SOLVENTS	Per Litre
Benzene	13.50
N-Heptane	8.00
N-Hexane	8.75
Methanol	7.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	14.00
Xylene	16.00

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

Alphanaphthylamine	60.00
Alpha Naphthol (Imp.)	180.00
Aceto Acetic Ester (Methyl)	60.00
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Anthraquinone	95.00
Anthranilic Acid	60.00
2-Amino-4-Nitrophenol (Imp.)	155.00
Blue B. Base (Local)	230.00
Beta Naphthol (Atul)	58.00
Benzidine Dihydrochloride (BDH)	80.00
Bromamine Acid	400.00
BON Acid	116.00
Chicago Acid	280.00
Coach Acid	56.00
C. Acid (Imp.)	260.00
Cyanuric Chloride (Japan)	120.00
2, 4, DNCB	29.00
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Dimethyl Aniline	69.00
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3, 3-DCB (Imp.)	180.00
Gamma Acid (Atul)	170.00
H. Acid (Atul)	155.00
G. Salt	60.00
Isophthalic Acid	45.00
J. Acid	265.00
J. Acid Urea	280.00
K. Acid	100.00
MDPS (German)	200.00
MNA	90.00
MPD (Local)	135 + Ex.
MPD (Japan)	200.0
Naphthenic Acid	12.0
N-Methyl J. Acid	380.0
N-Methyl Aniline	115.0
Naphthalene (Refined)	23.0
Ortho Anisidine (OA Imp.)	85.0
Ortho Dichloro Benzene (ODCB)	11.2
OT Base	100.0
Para Dichloro Benzene (PDCB)	16.0
Para Anisidine (PA-Imp.)	110.0
Para Anisidine (PA-Local)	90.0
PNA	70.0
Para Cresidine (Imp.)	335.0
Para Amino Azo Benzene (India)	125.0
PNCB	31.0
Para Amino Acetanilide	145.0
1-Phenyl 3-methyl-5 Pyrazolone	120.0
Phenyl J. Acid	345.00
Para Amino Benzoic Acid	170.00
PT Base	88.00
Rhoduline Acid	500.00
Resist Salt	22.00
Resorcinol	145.00
Sodium Naphthionate	65.00
5-Sulpho-Anthranilic Acid	64.00
Sulphanilic Acid	25.00
Sulpho Tobias Acid	115.00
Trichloro Benzene (TCB)	17.00
Tobias Acid (Atul)	125.00

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(Inquiries for Acetone Cyanohydrine (GUJACH) and Methyl Methacrylate Monomer (GUJMER) for chemical application also solicited.)

Bombay dyes market

(prices as on 21st July 1988)

ACID COLOUR	Per Kg.
Acid Violet 4BS	163.00
Acid Maroon V	113.00
Acid Orange II	77.30
Acid Orange IIY	63.05
Acid Red A	107.25
Crosein Scarlet MOO	155.00
Acid Scarlet 3R	99.90
Acid Red 3BN	135.00
Acid Red B2R	132.00
Acid Red RS	88.00
Acid Green V	230.00
Acid Patent Blue AB	250.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	121.95
Acid Black BX	68.40
Acid Black Wax	135.50
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	251.00
Procinil Rubine (ICI, UK)	554.00

DIRECT COLOURS	Per Kg.
Yellow 3GX	88.15
[illegible] Yellow RCH	224.10
Fast Yellow GCH	141.15
Yellow CPG Hly. Conc.	312.00
Fast Yellow GS	111.65
Fast Yellow CRRS	95.45
[illegible] Orange A	160.15
Fast Orange 2R	134.75
Red	98.90
Dark Tan	73.25
Red HR	72.55
Red 4B	160.10
Bordeaux BW	132.30
Fast Scarlet 4BS	166.55
Red [illegible]	170.35
Bordeaux Hly. Conc.	[illegible]
Congo Red S	137.05
Brill. Fast Red [illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Brill. Violet Extra	126.40
Blue 2B	86.60
Blue G	170.50
Sky Blue FB	188.25
Copper Blue GR	147.00
Fast Greenish Blue GL	114.60
Developed Black BT	116.10
Blue NB-2B	300.20
Blue NB-2BC	185.80
Developed Black NB-GHB	185.30
Green B	111.65
Green NB-B	188.25
Green 2B-N	188.25
Brown MR	154.40
Brown CN	107.25
Golden Brown G	140.35
Catechin G	120.50
Omega Tan	126.40
Catechin GS	102.80
Black E Hly Conc.	142.60
Black E Extra Hly. Conc	142.60
Black NB-ER Hly. Conc	320.50
Scarlet RR	
Rubine SB	
Rubine CB	
Blue GL	
Blue BGF	
Navy Blue RF	
Brown SREL	
Black GEL	
Dark Brown SB	

DISPERSOL COLOURS	Per Kg.
Yellow 6G Powder	143.80
Red B 3B Powder	247.80
Red B 2B Powder	323.20
Red CB Powder	438.15
Red DBB Powder	477.40
Violet C 4R	521.90
Blue BG Powder	235.45
Blue BN Powder	188.75
Blue D 2R Powder	476.25
Navy BT Powder	243.96
Blue B 2G Powder	[illegible]
Black BT Powder	182.60
Blue BR Powder	[illegible]
Yellow 7GL	338.60
Yellow 3RL	118.60
Yellow 3G	367.25
Yellow	[illegible]
Yellow AL	135.30
Yellow Brown REL	247.30
Yellow FFL	463.60
Gold Yellow GG	250.70
Pink REL	247.00
Red REL	468.65
Red 2B	[illegible]
Red FB	[illegible]
Red Violet FBL	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

BASE COLOURS	Pe
Fast Yellow GC	
Fast Orange GC	
Fast Scarlet R	
Fast Scarlet RC	
Fast Scarlet RCR	
Fast Scarlet G	
Fast Scarlet GN	
Fast Scarlet GG	
Fast Scarlet GGS	
Fast Red B	
Fast Red RC	
Fast Red R Flakes	
Fast Red TR	
Fast Red TR Oil	
Fast Red RL	
Fast Red KB Oil	
Fast Bordeaux GP	
Fast Garnet GBC	
Fast Violet B	
Fast Blue BB	

NAPHTHOL COLOURS	Pe
ASG	
AS	
ASSW	
ABBS	
ASBO	
ASD	
ASEL	
ASTR	
ASPW	
AST	
[illegible]	
[illegible]	
[illegible]	

RS	Per Kg.
R	181.80
G	117.85
-8GP	168.55
8G	168.95
	278.15
1G	332.30
	243.95
	328.95
M4G	177.10
8G	332.30
	217.80
H 2R	241.22
7B	157.85
M 2R	313.15
3B	189.45
H BN	243.95
H-3BP	179.80
-F3B	243.45
na H-	187.90
M 5B	98.90
M 3B	173.70
MB	197.10
ota MP	121.55
e H-3R	180.20
e H-7R	175.40
H 3R	291.50
H-GR	968.55
H 8G	173.10
	261.15
H 9G	179.70
H TRX	252.15
LA	234.45
H-3RF	335.70
uoise H 3GP	181.50
C	260.00
H ER	183.90
[illegible]	260.40
Navy Blue M 3R	301.80
Brill. Blue MR	331.70
Brill. Blue M RX	274.30
Brill. Blue M-G	282.30
Blue M 4GD	344.90
Navy Blue M RB	312.75
Turquoise M-G	197.85
Brill. Blue M GX	302.50
Blue 3R Acra Powder	718.20
Dark Brown H 6B	348.45
Cobalt Oxide (per kg.)	201.70
Green H 4BD	261.80
Green H-E4BI	159.80
Red Brown H 1F	142.25
Orange Brown H 2R	206.15
Brown M GRN	182.80
Black H-N	221.38

SULFUR COLOURS	Per Kg.
Navy Blue	86.25
Green G	198.55
Black Grains Extra	63.95
Black Grains OG	64.55
Black GXE Conc.	61.60
Black GXE	52.75
Black GXR	61.60
Black Grains 800	54.20
Black EXR Grains	64.55
Black EXR Grains 800	51.25

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Powder Fine	673.15
Yellow 5G Supra Disperse	436.30
Yellow 5G Acra Con	692.75
Yellow 3R Powder	588.85
Gold Orange 3G Pdr. Fine	852.15
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp.	491.30
Brill. Orange 6RX Powder	364.30
Brill. Red 3B Pdr. Fine	997.80
Brill. Red 3B Supra Disp.	711.30
Brill. Purple 4R Conc. Pdr.	470.75
Brill. Purple 3R Acra Powder	630.25
Brill. Purple 3R Hiy. Conc.	597.80
Brill. Purple 4R Supra Disp.	510.15
Brill. Purple 3R Acra Conc.	622.85
Blue B Powder Fine	542.15
Blue BC Conc. Pdr. Fine	532.50
Blue BC Acra Conc. Pdr. Fine	782.70
Blue R Conc. Pdr. Fine	877.60
Blue RR Supra Powder	658.30
Blue Conc. Powder	562.80
Brill. Blue 2R Hiy. Conc.	778.95
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	309.25
Blue BC Supra Disp.	356.40
Jade Green XBN Powder Fine	438.20
Jade Green XBN Acra Conc. Powder	621.80
Jade Green 2G Pdr. Fine	419.05
Jade Green 2G Pig. Paste	125.40
Jade Green XBN Pig. Paste	128.00
Jade Green 2G Supra Disp.	490.90
Olive Green B Pdr. Fine	590.90
Olive D Pdr. Fine	664.30
Olive Green B Supra Disp.	388.25
Jade Green XBN Supra Disp. (N)	327.35
Olive GMW Pdr. Fine	668.30
Olive GMW Supra Disp.	536.05
Olive R Pdr. Fine	422.50
Olive D Supra Disp.	361.70
Olive R Supra Disp.	363.90
Olive D Pig. Paste	190.00
Olive Green B. Pig. Paste	196.10
Olive Green B Acra Conc.	562.75
Olive R Acra Conc.	446.00
Olive Green B Acra Conc.	542.75
Brown R Pdr. Fine	525.30
Brown G. Pdr. Fine	785.40
Brown R Pdr. Fine	656.75
Dark Brown 3R Pdr. Fine	625.00
Brown G Supra Disp.	449.90
Brown 2G Supra Disp.	554.00
Brown R Supra Disp.	422.00
Brown BR Powder	719.00
Dark Brown 3R Pig. Paste	207.10
Dark Brown 3R Supra Disp.	471.35
Brown G Acra Conc.	728.45
Brown R Acra Conc.	[illegible]
Grey M. Powder Fine	760.85
Grey M. Supra Disp.	605.45
Blue BC Acra Conc. Pdr. Fine	782.70
Direct Black AC Supra Disp.	376.35
Direct Black AC Pdr. Fine	474.70
Direct Black CE Supra Disp.	303.20
Direct ACD Pig. Paste	[illegible]

Madras Market

There has not been much activity in the chemical market. The timely rains have brought hopes for revival of activity. The handloom centres have started receiving overseas orders and it is expected to improve their working in the coming months. Also, there are encouraging reports of cotton imports by Government and consequent availability of yarn at reasonable prices. Trisodium Phosphate was under short supply with the prices marking up. Otherwise the markets were steady at previous levels.

(MADRAS MARKET RATES AS ON JULY 23, 1988)

Acetic Acid — Glacial (per kg)	18.00
Acid Slurry (Soft) (per kg)	27.00
Aluminium Sulphate Iron free (per tonne)	1,700.00
Ammonium Bi-carbonate (per 25 kg.)	125.00
Ammonium Chloride SPIC (per tonne)	2,500.00
Bleaching Powder — Mettur (per 25 kg bags)	125.00
Borax Granular	660.00
Cresylic Acid 98/99% (per kg)	87+E.D.
Meta Cresol 40/42% (per kg)	39.00+E.D.
Para Cresol 80/85% (per ton)	60+E.D
Caustic Soda Flakes (Mettur) (per ton)	8,600.00
Caustic Soda Flakes (Andhra Sugar)	8,600.00
Citric Acid — Indian (per kg)	48.00
Copper Sulphate (per 50 kg)	1000.00
Formic Acid (India) (per kg)	27.00
Formaldehyde (per kg)	8.00
Glycerine (per kg)	45.00
Hydrosulphite of Soda TCPL (per kg)	40.00
Hydrosulphite of Soda IDI (per kg)	45.00
Hydrosulphite of Soda BASF (per kg)	48.00
Hydrogen Peroxide (India) (per kg)	30.00
Hyflo Supercell	18.50
Magnesium Carbonate Light	18.00
Potassium Bichromate (per kg)	27.00
Phosphoric Acid (per kg)	18.50
Phthalic Anhydride (per kg)	24.00
Paraffin Wax (per kg)	13.50
Oxalic Acid (per kg)	20.00
Soda Ash (TAC) (per 75 kg)	325.00
Soda Ash (TATA) (per 75 kg)	320.00
Sodium Cyanide Indian (per kg)	55.00
Sodium Cyanide Degussa (per kg)	80.00
Sodium Bichromate (per kg)	18.00
Sodium Bicarbonate (per 50 kg)	290.00
Sodium Nitrite (per 50 kg)	750.00
Sodium Nitrate (per 50 kg)	450.00
Sodium Silicate (per tonne)	4500.00
Sodium Sulphate (per tonne)	3500.00
Sodium Sulphide Flakes (per tonne)	13,000.00
Sodium Bi-sulphite (Aswin) (per MT)	3,800.00
Stearic Acid (per kg)	32.00
Trisodium phosphate (per 50 kg)	425.00
Titanium Di-oxide Indian TTP (per kg)	48.00
Titanium Di-oxide Indian Rutile (per kg)	58.00
Urea Tech (per tonne)	2,800.00
Zinc Oxide (per kg.)	34.00
Zinc Chloride Powder (per kg.)	13.00
Zinc Sulphate (per tonne)	4,800.00
Di-octyl phthalate (per kg)	43.00
Di-butyl phthalate (per kg)	44.00
Hexamine (per kg)	32.00

SOLVENTS

Acetone (IOC) (per kg)	18.75
Isopropyl Alcohol NOCIL (per kg)	22.00
Diacetone Alcohol NOCIL (per kg)	29.00
Benzene SAIL (per kg)	16.00
Diethylene Glycol NOCIL (per kg)	48.00
Butanol NOCIL (per kg)	34.00
Toluene SAIL (per litre)	13.00
Xylene IPCL (per litre)	16.00
Phenol HOC (per kg)	30.00
Turpentine (per litre)	16.50
Sorbitol (per kg)	35.00
Trichloroethylene MCIC (per kg)	23.50
Carbon Tetra Chloride (per kg)	16.00
Chloroform (per kg)	26.00
Methylene chloride (per kg)	25.00
Methyl Ethyl Ketone (per kg)	48.00
Cellosolve (per kg)	52.00
Triethanolamine (per kg)	23.50
Ethyl Acetate (per kg.)	22.00
Butyl Acetate (per kg)	44.00
Methanol (per litre)	10.00

Delhi Market

; **JULY 21, (NNS) —** Sufo-
d titanium dioxide RC. 822 up by Rs. 7/9 per kg. in the
emicals market during last ollowed by hike its prices by cturers., says NNS. Mercury mped up by Rs. 500 per flask, artaric and citric acid nose-di- Rs. 25/110 on poor offtake. er was moderate.

olight recorded a gain of Rs. 7 57 per kg. owing to scanty sup- osition as well as hike its prices . 8 at Rs. 54.25 by manufactur- Chatkolight edged up by Rs. 1.25 . 49.25 on poor import from and sharp rise in the price of ight. Sodium hydro sulphite Kalali Damosha advanced by 50 paise 1 at Rs. 42.50 and Rs. 40.50/41 eas Hydro Tamilnadu drifted low- y Rs. 1 at Rs. 40 per kg. in the nce of offtake. Hydro Gulshan rui- asy at Rs. 38 per kg.

itanium dioxide RC. 822 recorded ain of Rs. 9 at Rs. 72 on heavy chasing made by stockists on ru- urs of increased prices from Rs. to Rs. 72 per kg. by manufacturers. anium dioxide Anatase sold higher Rs. 52.50 against Rs. 49 on good nand by paint manufacturers.

Ammonia bicarb moved up by Rs. 10 at Rs. 135 per 25 kg. on reports of about 3000 kattas of the commodity despatches to Calcutta from Delhi and good demand by bakeries. Tartaric acid dropped by Rs. 50 at Rs. 6050 per 50 kg. on poor offtake due to rains. Citric acid also nose-dived by Rs. 25/110 at Rs. 1940/2375 on comfortable stock position. Borax granular and crystal tumbled down by Rs. 25 each at Rs. 550 and Rs. 575 on stockists selling. Sodium nitrate and nitrite prices also pushed down by Rs. 10/25 at Rs. 440 and Rs. 700/725 on withdrawal of support. Menthol bold and flake softened by Rs. 1/2 per kg. on reports of about 500/600 kg of the commodity commenced from U.P. Mercury recorded a handsome gain of Rs. 500 at Rs. 11,500 per flask on negligible stock position in the market as well as higher advices from Bombay. In the month of May 1988 the commodity was traded at Rs. 9800 per flask. Camphor thal hardened by Rs. 1 at Rs. 98 and camphor powder ruled static at Rs. 87 on sustained demand by stockists. Formic acid advanced by Rs. 1 at Rs. 26/27 on reduced offerings.

Dyes and colours recorded no change on thin trading.

(DELHI MARKET RATES AS ON JULY 21, 1988)

nmonia Bicarb (per 25 kg)	135.00
ercury (per flask)	11,500.00
oda ash (per bag)	270-300.00
mmonium chloride (per 50 kg)	125-180.00
austic soda solid	**No Stock**
austic soda flakes (per 50 kg)	405-406.00
itric acid (per 50 kg)	1940-2375.00
table Bleaching Powder Shriram (per 25 kg)	**95.00**
table Bleaching Powder KCl (per 25 kg)	**85.00**
table Bleaching Powder MODI (per 25 kg.)	**90.00**
od. Bicarbonate (per 50 kg)	260-270.00
od. Hydro Sulphite (per kg)	38-42.50
angolite (per kg)	48-70.00
Boric acid Technical (per 50 kg)	1020.00
Paraffin wax (per 50 kg)	625.00
Tartaric acid (per 50 kg)	6,050.00
Borax Granular (per 50 kg)	550.00
Borax Crystal (per 50 kg)	575.00
Sodium Nitrate (per 50 kg)	400.00
Sodium Nitrite (per 50 kg)	700-725.00
Camphor Powder (per kg)	87.00
Camphor Thal (per kg)	98.00
Menthol Medium (per kg)	215.00
Menthol Flakes (per kg)	198.00
Menthol Bold (per kg)	222.00
Glycerine (per kg)	44-45.00
Sodium Silicate (per quintal)	200-250.00
Hexamine (per kg)	42.00
Acetic Acid Glacial (per kg)	13-13.50
Copper Sulphate (per quintal)	2100-2300.00
Formic acid (per kg)	26-27.00
Formaldehyde (per kg)	8.00
Hydrogen Peroxide (per kg)	30-31.00
Calcium Carbonate (per tonne)	**2500-4000.00**
Acid Slurry Soft (per kg)	**24.00**
Acid Slurry Hard (per kg)	**32.00**
Phosphoric Acid (per 50 kg)	870.00
Pot. Nitrate (per quintal)	**900-1200.00**
Pot. Permanganate (per 50 kg)	2300.00
Sod. Bichromate (per 50 kg)	1050-1150.00
Tri-Sod. Phosphate (per 50 kg)	350-380.00
Titanium Dioxide Anatase (per kg)	62.50
Titanium RC-822 (per kg)	72.00
Zinc Oxide (per mt)	35,000-42,000.00
Phenol Carbolic Acid (per kg)	33.00
Carbon Tetrachloride (per kg)	20.00
Chloroform (per kg)	28.00
Sodium Sulphate (per 50 kg)	160-170.00
Naphthalene Balls (per 50 kg)	1350.00

DYES & COLOURS	**(per kg)**
Naphthol AS	150.00
Naphthol ASG	235.00
Naphthol ASBS	200.00
Naphthol ASTR	302.00
Naphthol ASOL	191.00
Naphthol ASBO	208.00

DIRECT DYES	**(per kg)**
Black E. Conc.	92-155.00
Diazo Black B.T.	125.00
Green B.	119.00
Blue 2-B	86.00
Sky Blue FB	200.15
Basic Auramine	55-100.00
Basic Rhodamine	220-320.00
Basic Methylene Blue	92-130.00
Basic Violet	142-160.00
Basic Malachite Green	160-185.00
Acid Orange	45-52.00

Plastic Materials Imported

BOMBAY

From 9.2.88 To 15.2.88

CAPROLACTAM: From UK: ICB Vrani 80,750 kgs., Rs 21,70,272.

EMULSIFIABLE POLYETHYLENE WAX: From Germany: Paragon Chemical Inds., 12,000 kgs., Rs 3,65,536. From Japan: Kamaya Chemical Inds., 2 Mts., Rs 40,543.

HDPE: From Canada: Bharat Vijay Mills Ltd., 74.250 Mts., Rs 8,89,778; From Denmark: Sangeeta Bros., 17 Mts., Rs 2,16,379; From FRG: Prestige HM — Polycontainers Ltd., 1,21,700 kgs., Rs 15,82,834; Prestige HM — Polycontainers Ltd., 1,77,658 kgs., Rs 22,72,981; From Japan: Garware Wall Ropes Ltd., 18.5 Mts., Rs 2,39,682; Sumitra Plastics Ltd., 19.100 Mts., Rs 13,21,084; From Saudi Arabia: Chema Plast Packagings, 17,150 kgs., Rs 2,21,969; Continental Plastic Inc. 49.5 Mts., Rs 6,10,531; Evershine Plastics Inds., 17.150 Mts., Rs 2,34,696; Grover Overseas P. Ltd., 34,300 kgs., Rs 4,18,606; King Plastics, 120.050 Mts., Rs 14,57,326; Plastic Processors, 17.267 Mts., Rs 2,31,569; Plastics Processors, 17,150 kgs., Rs 2,32,569; Southern Union Plastic Inds., 49.5 Mts., Rs 6,10,537; Wadhwa Inds., 17.15 Mts., Rs 2,21,969; From Singapore: Nikhil Plastics Pvt. Ltd., 132 Mts., Rs 15,42,329; T M Valia & Sons 99.0 Mts., Rs 12,60,494; From Yugoslavia: Ishwar Arts 100 Mts., Rs 14,61,312; Rising Star Plastics Pvt. Ltd., 50 Mts., Rs 5,24,250 Mts., Rs 1,60,177; Sarda Plastics 16,000 kgs., Rs 1,82,063.

HDPE FILM GRADE: From Korea: Indo Burma Trading Corpn., 85 Mts., Rs 10,96,890.

HDPE MOULDING POWDER: From Yugoslavia: Siltap Chemicals Ltd., 32 Mts., Rs 4,20,987; From Japan: National Plastic Enterprises, 32 Mts., Rs 3,39,699; Star Plastics 32,000 kgs., Rs 4,23,288.

HDPE POWDER STAFELENE E-710: From Germany: Eastern Chemical Inds., 50 Mts., Rs 7,14,073.

HIGH IMPACT POLYSTYRENE: From Korea: Steriplate P. Ltd., 45,000 kgs., Rs 16,00,165.

LDPE: From Belgium: Garware Nylons Ltd., 20 Mts., Rs 2,48,159; From Canada: The Bharat Vijay Mills Ltd., 74.250 Mts., Rs 8,89,778; From China: Dipen Enterprise, 20 Mts., Rs 2,48,159; From Hong Kong: Ecoplast Pvt. Ltd., 399.08 kgs., Rs 8,290; From Singapore: Commercial Explosives Ltd., 17 Mts., Rs 2,33,958; Essge Plastics (P) Ltd., 16.5 Mts., Rs 2,18,508; From USA: Finolex Cables Ltd., 113 Mts., From Yugoslavia: Amisoap World Enterprises, 40 MT Rs 4,96,318; From USA: Finolex Cables Ltd., 1.089 Mts., Rs 25,449.

LLDPE: From Saudi Arabia: Jamnadas Murlidhar Jaisingh 24.750 Mts., Rs 3,06,875.

POLY PROPYLENE: From USA: Bharat Heavy Electricals Ltd., 800 kgs., Rs 3,16,471; Puru Plast Ltd., 50 Mts., Rs 15,43,425; Madhya Pradesh United Ltd. 50 Mts., Rs 3,24,881.

Mexico: Industrial Plasti
Mts., Rs 2,06,742; New Pl
mers Ind. P. Ltd., 50 Mts
2,06,742; From USA: K
Metal Co. 17 Mts., Rs 2,24

POLYSTYROL: From K
Jolly Plastics, 34 Mts
6,48,903.

POLYSTYROL K: From
rea: Glorious Plastics
17,000 kgs., Rs 8,19,949.

PTFE DISPERSION FLUO
CARBON RESIN: From Ja
Mechanical Pckg. Ind. Pvt
1,000 kgs., Rs 1,29,522.

PTFE RESIN: From Ja
Indian Engineers, 1,000 kgs
1,11,657; From Japan: Ind
Polymers, 750 kgs., Rs 9
Mechanical Pckg. Pvt. Ltd.,
kgs., Rs 2,42,986; From U
Bombay Fluoroplast P.
23.4 kgs., Rs 7675; From Ja
Dipflon Engg. Ltd., 1,000
Rs 1,19,121; Voltas Ltd.
kgs., Rs 1,36,324.

PVC RESIN: From F
Consumer Plastics Pvt. Ltd
Mts., Rs 1,89,072; From Me
Prakash Pipes & Inds. Ltd.,
Mts., Rs 2,725,786; From
Johnson & Johnson Ltd., 3
Rs 81,798; From Yugosla
Space Age Chemplast Pvt.
10 Mts., Rs 1,11,481.

PVC RESIN PASTE GRA
From Saudi Arabia: Roto Sc
Tech. Pvt. Ltd., 50 Mts.
7,40,090.

PVC RESIN SUSPENS
GRADE: From Korea: A
Indl. Corpn., 1,26,625 kgs
14,53,848; Ashish Inds., 50
Rs 6,11,846; From Paki
Arora Traders, 50 Mts
6,18,213; From Burm
Delta Lighting & Plast
Ltd., 100 MT, Rs 13,1

CRYLONITRILE
Singapore; Petro
Chemicals, 19
,460. From USA :
18,379 Mts., Rs

RESIN SK
parivala Exporte
8,104.
C RESIN POLY-
From USA :
kaging & Plastic
2,43,046.
C RESIN POLY-
OHOL : From Tai-
ame India Interna-
kgs., Rs. 66,372.

S & DYE
ATES IMPORTED
BOMBAY
2.88 to 15.2.88)

PHOR ER LIQUID.
Shri Arbuda Mills
s., Rs. 1,44,506.
YELLOW SULPH-
Saudi Arabia : Mine-
Metals Trading Corp.,
Rs. 2,79,86,799.
C COLOUR YEL-
223 TURQUOISE 14
4 M 736 375 : From
ra Ceramics Pvt. Ltd.,
Rs. 3,94,189.
NT A2 BLUE AND
From UK : VXL
400 kgs., Rs. 16,709.
From China : Associa-
ff Inds., 750 kgs. Rs
Associated Dyestuff
kgs., Rs. 67,637, Asso-
stuff Inds. 1,000 kgs.,
Associated Dyes-
tries 2,000 kgs. Rs

DYES INTERMI
From Belgium
[illegible]

Pvt. Ltd. 1,000 kgs., Rs. 1,39,832.

FORON BLUE S BGL : From FRG : Telephone Cables Punjab Ltd., 500 Mts., Rs. 1,26,291.

SAMARON BLACK HBBL LIQUID 200 : From FRG : Vinayak Distributors, 500 kgs., Rs. 37,346.

SULPHUR BLUE BRN 150 : From China : Fancy Dyeing & Printing Works. 2,900 kgs., Rs. 1,01,940.

SULPHUR YELLOW BROWN 5G : From China : Fancy Dyeing & Printing Works. 2,000 kgs., Rs. 57,326.

SYNTHETIC ORGANIC DYESTUFF : From Indonesia : Vipul Dyes & Chemicals P. Ltd., 1,000 kgs., Rs. 96,882; From Korea : Jalan Woollen Inds., 2,200 kgs., Rs. 1,23,734.

DRUGS MATERIALS IMPORTED BOMBAY

From 8.2.88 To 15.2.88

CALCIUM D PANTOTHENATE USP : From Japan : Bombay Pharma Products. 500 kgs., Rs. 67,437.

CALCIUM D PANTOTHENATE : From UK : Roche Products Ltd., 300 kgs., Rs. 53,302; The Anglo French Drug Co. (E) Ltd. 750 kgs., Rs. 1,31,456.

CHLORMEZANONE : From UK : Win Medicare Ltd., 200 kgs., Rs. 1,26,818.

CYSTEAMINE HYDROCHLORIDE : From Japan : Ranbaxy Laboratories Ltd. 1,500 kgs., Rs. 1,87,484.

ERYTHROMYCIN THIOCYANATE : From Italy : Surendra Chemicals. 2,777.2 kgs. Rs. 20,03,911.

PENICILLIN V POTASSIUM USP : From Japan : P.N. Dhoot [illegible] P. Ltd. 500 [illegible]

PROCAINE HYDROCHLORIDE : From Czechoslovakia : Hindustan Antibiotics Ltd. 5,000 kgs., Rs. 5,20,910.

PYRAZINAMIDE BP 80 : From Korea : Themis Chemicals Ltd. 400 kgs., Rs. 2,07,470.

SULPHADIAZINE BP : From China : Pharmapac Pvt. Ltd. 2,000 kgs., Rs. 3,06,246.

VITAMIN B6 USP IP : From FRG : E. Merck (I) Ltd. 1,000 kgs., Rs. 4,93,314.

VITAMIN B6 USP : From Japan : UNI-UCB Ltd. 250 kgs., Rs. 1,18,771.

ZINC BACITRACIN : From Yugoslavia : Bombay Pharma Products. 2,500 kgs., Rs. 12,856.

MATERIALS IMPORTED MADRAS

From 8.2.88 To 15.2.88

ACTIVATED CARBON : From France : Bharat Heavy Plates and Vessels Ltd., 200 kgs., Rs. 34,323.

D ALPHA PHENYLGLYCINE BASE : From Singapore : TTK Chemicals Ltd. 2,000 kgs., Rs. 3,76,192.

ALUMINIUM : From FRG : Mohan Breweries 3,292 kgs., Rs. 4,47,828.

AMMONIUM PENTABORATE : From Japan : Keltron Component Complex Ltd. 7,000 kgs., Rs. 1,19,797.

AROMATIC CHEMICALS : From FRG : N. Ranga Rao & Sons. 600 kgs., Rs. 2,61,812; From Japan : Bush Boake Allen (I) Ltd. 400 kgs., Rs. 57,064; From USA : Bharat Industries Corporation. 2,000 kgs., Rs. 1,07,361.

ARSENIC TRIOXIDE : From France : Southern Petrochemical Inds. 15,000 kgs., Rs. [illegible]

BENZALDEHYDE : From FRG : Jagat Chemicals Pvt. Ltd., 2 kgs., Rs. 500.

BORON TRIFLUORIDE GAS: From Japan : McDowell And Co. Ltd., 1,050 kgs., Rs. 2,21,782.

BUTACHLOR TECHNICAL : From USA : Tropical Agrosystem Pvt. Ltd., 3,49,201 lbs., Rs. 6,15,917.

N-BUTANOL : From USA : Siris India Ltd., 26,208 kgs., Rs. 2,78,713.

BUTYLATED HYDROXY ANISOLE : From Japan : DCW Ltd., 200 kgs., Rs. 44,095.

CALCINED ALUMINA POWDER : From Japan : Insulators Of India Ltd., 35,000 kgs., Rs. 3,09,552.

CARBON BLACK : From FRG: Kasturi Estates Pvt. Ltd., 1,012 Mts., Rs. 26,046.

DESMODUR R : From FRG: Meenakshi Molding (P) Ltd., 105 kgs., Rs. 17,648.

DESMODUR T 80 : FROM FRG : Joy Foam Pvt. Ltd., 6,250 kgs., Rs. 1,73,311.

DESMOPHEN 460 : FROM FRG : Lakshmi Machine Works Ltd., 700 kgs., Rs. 71,787.

DIMETHYL SULPHOXIDE : From Japan : Inventa Chemicals P. Ltd., 15,840 Mts., Rs. 3,46,561.

EPICHLOROHYDRIN : From Japan : Synthokem, 9,600 kgs., Rs. 2,16,748; Veeyor Polymers (P) Ltd., 3,600 kgs., Rs. 81,706.

EPOXY POWDER : From Japan : Indrad Auto Components Ltd., 162 kgs., Rs. 25,495.

ETHYLACETOACETATE : From FRG : T.T.K. Chemicals Ltd., 5,000 kgs., Rs. 1,49,144.

ETHYL CAPRYL : From FRG: Bush Boake Allen (I) Ltd., 450 kgs., Rs. 70,991; From UK : Bush Boake Allen (I) Ltd., 50 kgs., Rs. 9,442.

ETHYLENE GLYCOL : From Germany : Keltron Component Complex Ltd., 4840 kgs., Rs. 90,605.

2-ETHYL HEXANOL : From Germany : Chemidye Trading Co. Pvt. Ltd., 20,768 kgs., Rs. 2,57,761.

FORMIC ACID 85% : From FRG : Tata Exports Ltd., 20,160 kgs., Rs. 1,54,259.

FLUOROCARBON RESIN MOLDING POWDER : From USA : Xenox (India) Ltd., 1 kgs., Rs. 63,767.

GAMMA PICOLINE : Fro Japan : Veer Chemie & Aromatics Ltd., 10,070 kgs. Rs 3,82,156.

GUANIDINE CARBONATE From Australia : IEL Ltd. 63 kgs., Rs. 50,787.

GUM ROSIN : From Singapore : K.D. Shah Enterprises, 5 kgs., Rs. 300.

HELIOTROPIN: From Japan Bharath Indl. Corpn., 540 kgs Rs. 1,47,070.

HEXAMETHYLENE DIAMINE ADIPATE : From France Shriram Fibres Ltd., 35 Mts Rs. 10,42,429.

HYDROFLUORIC ACID Fro FRG : ITI Ltd., 2,669 kgs., R 59,887.

HYDROQUINONE: From Italy: Kantilal Manilal & Co; 39,00 kgs., Rs. 6,80,468; From Japan Kantilal Manilal & Co., 8,50 kgs., Rs. 3,48,472.

HYDROXY ETHYL CELLULOSE : From FRG : K.N. Char Rubber & Plastics, 2 kgs., Rs 200.

For Your Bulk Requirements Of :

1) FATTY ACIDS — Oleic, Recenolic, Linoleinic, Linseed Oil Fatty Acid & Coconut Fatty Acid.

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Regd. Office — A-10/3, Indrayudha Housing Society, M. G. Road, Goregaon (W), Bombay-400 090. Phones : 697514, 6722018.

Admn. Office — G-42, D Wing, [illegible] Apts. No. II, [illegible] Vasai Road (East) [illegible] Vasai Phone : 944

OXY ETHYLIDE-
Italy : Chemicals &
Ltd. 3,000 kgs., Rs.

YLAMINE SULPHA-
Japan : Plant Orga-
,700 kgs., Rs. 75,274.
XYLAMINE SULPH-
m Japan : SPS Drugs
10 Mts., Rs. 2,85,847.
RNYL CYCLOHEXA-
m France : Bharat In-
Corpn., 3,000 kgs., Rs.

AMPHYL CYCLOHEX-
From France : Sri Am-
ng Co. 700 kgs., Rs.

PROPYL ALCOHOL :
aiwan : Chandra Phar-
cals Ltd., 38.40 Mts., Rs.
From USA : Dr. Red-
Laboratories Ltd., 26,020
. 2,04,293.

TOSE POWDER USP :
Netherlands : Kawarlal &
,000 kgs., Rs. 6,83,844.

D SULPHITE: From UK:
Brake Linings Ltd., 2,400
s. 81,025.

METHACRYLIC ACID: From Japan : Indian Syntans Pvt. Ltd., 15,200 kgs., Rs. 3,74,547.

D.L. METHIONINE: From Japan : SKM's Energy Animal Feeds P. Ltd., 2,000 kgs., Rs. 77,815.

METHOCEL : From UK : Astra IDL. Ltd., 226.80 kgs., Rs. 61,402.

METHYL CEDRYL KETONE: From France : N. Ranga Rao & Sons, 200 kgs., Rs. 52,394.

METHYL ETHYL KETONE : From FRG : Madras Refineries Ltd., 15,010 kgs., Rs. 1,85,118.

MODIFIED CALCIUM CARBONATE : From FRG : Coromandel Prodorite Ltd., 51 kgs., Rs. 3,793.

PARA TERTIARY BUTYL PHENOL : From FRG : Resins Ltd., 3,000 kgs., Rs. 52,525.

PIPERONYL BUTOXIDE : From UK : IEL Ltd., 1.50 kgs., Rs. 250.

PIVALOYL CHLORIDE: From France : TTK Chemicals Ltd., 3,960 kgs., Rs. 2,66,115.

POLYETHYLENE: From Singapore : Vikram Enterprises, 3,250 kgs., Rs. 38,025.

POLYVINYL ALCOHOL : From France : Bharat Electronics Ltd., 750 kgs., Rs. 78,736; From Japan : Balaji Fine Chemicals, 1 Mt., Rs. 20,751.

PYRIMIDINE OXIDE : From USA: Dr. Reddy's Lab. Ltd., 0.25 kgs., Rs. 250.

SODIUM FORMATE : From Italy : TNCP Ltd., 160 Mts. Rs. 6,64,016.

TERTIARY BUTANOL: From FRG : IEL Ltd., 12,000 kgs., Rs. 2,63,225.

3, 4, 5 TRIMETHOXY BENZALDEHYDE : From France : Coastal Pharma Chemicals, 1,000 kgs., Rs. 2,98,289; From Japan : Standard Organics Ltd., 4.020 Mts., Rs. 13,03,392; From Netherlands : Savera Laboratories Pvt. Ltd., 1.250 Mts., Rs. 3,55,329.

THYMOL PX : From Japan : Dharangadhra Chemical Works Ltd., 50 kgs., Rs. 29,415.

ZINC STEARATE: From UK: Sundaram Fastners Ltd., 525 kgs., Rs. 13,271.

FOR YOUR REQUIREMENTS OF :

DTA DI SODIUM SALT
MMONIUM THIOCYANATE
OTASSIUM THIOCYANATE
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MMONIUM CARBONATE
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EAD ACETATE
ROMO BENZENE

GLYCINE USP/BP
(Amino Acetic Acid)
CALAMINE IP/BP
(MFG. FREZCO CORPORATION)

AMMONIUM BROMIDE
GLYCINE (Pure)
ACETAMIDE
ZINC CARBONATE
SODIUM BROMIDE
COPPER SULPHATE
HIPPURIC ACID
LEAD NITRATE

ETHYLENE THIO UREA-NA 22
PLEASE CONTACT :
M/s. PASCO TRADERS
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Bombay-400 058.
Phone Offi : 6322847 Resi. : 6433549

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66% W/W
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CELLOSOLVE
BUTYL CELLOSOLVE
METHYL CELLOSOLVE
GLYCINE
B.H.T. (Antioxidant)

DIOCTYL SODIUM
SULFOSUCCINATE
(D.O.S.S.)
POLYSORBATE-80
(TWEEN-80)
E.D.T.A. & SALTS

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Vimal Udyog Bhavan, 6A, 2nd Floor,
Opp. Badal-Bijali Cinema, Mahim,
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HYDROBROMIC ACID
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HYDROBROMIC GAS
IN ACETIC ACID
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ISOPROPYL BROMIDE

METHYL CHLORO ACETATE
ISOAMYL BROMIDE
N-BUTYL BROMIDE
ETHYL BROMIDE
CETYL BROMIDE
LITHIUM BROMIDE
ISOPROPYL CHLORO ACETATE
ETHYL CHLORO ACETATE

ISOPROPYL ACETATE
BENZOYL CHLORIDE
ACETYL CHLORIDE
CHLORO ACETYL CHLORIDE
CAPROIC ANHYDRIDE
ETHYL FORMATE
SODIUM BROMIDE
POTASSIUM BROMATE

Contact Manufacturers :

SONTARA ORGANO INDUSTRIES

OFFICE :
3-A Mangaldas Bldg. 2nd Floor,
R.N. 242, Mangaldas Road,
Bombay-400 002.
Phone : 3155681 (O)
Resi. : 522207, 4123313

FACTORY :
SHED 16, M.I.D.C. CHEMICAL
ZONE, AMBARNATH-421 501.
Phone : 2483 (F)

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Caffeine I. P.
Mefenamic Acid B.P.

Also Available :

EPHEDRINE HCL
LACTIC ACID
CALCIUM LACTATE
SODIUM LACTATE

PARACETAMOL
LIGNOCAINE HCL
MALT EXTRACT
MAGNESIUM TRISILICATE

ALUMINIUM CHLORIDE
LITHIUM CHLORIDE
LITHIUM CARBONATE
SFS

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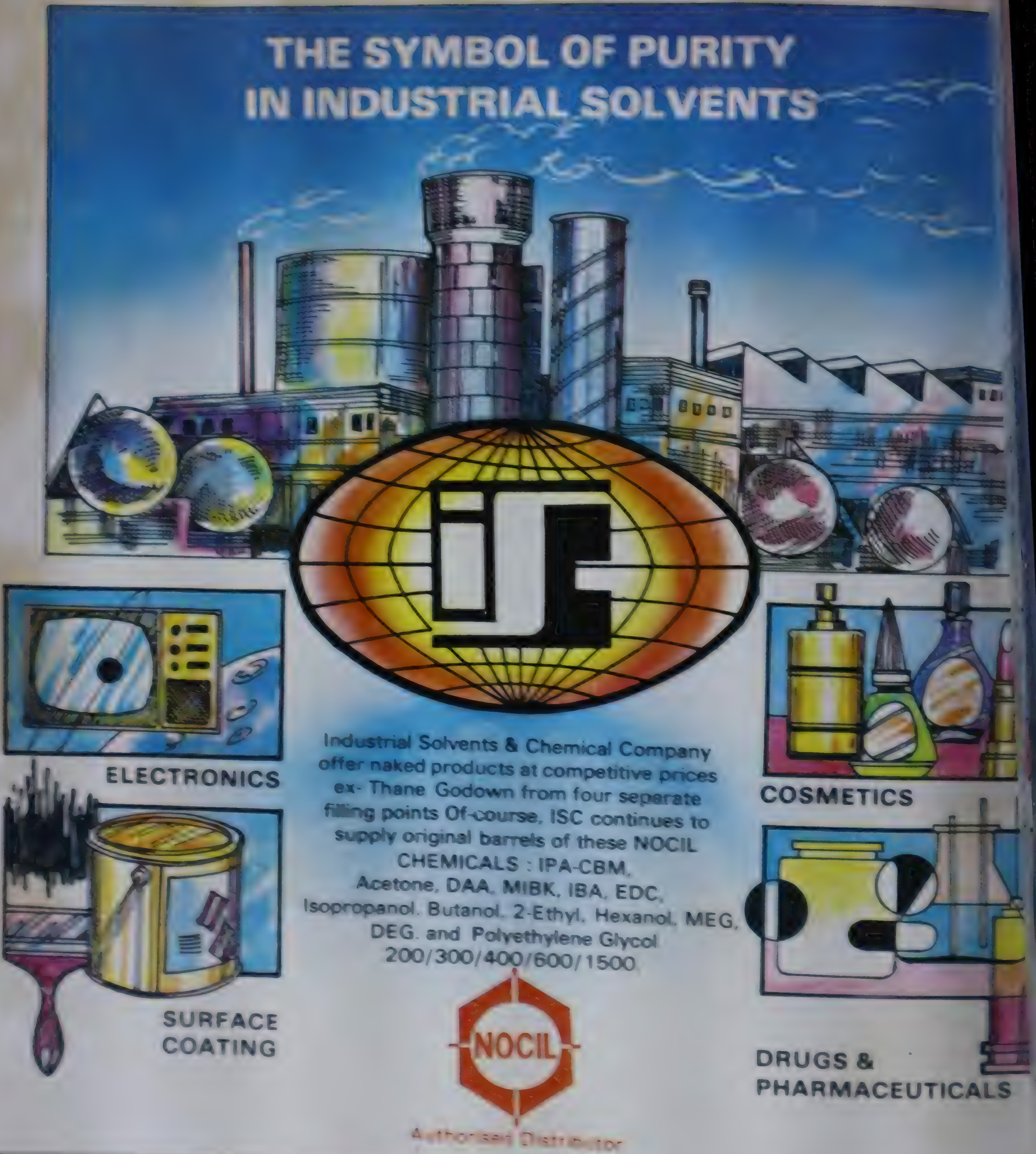

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CHEMICAL WEEKLY

VOL. XXXIII AUGUST 9, 1988 NO. [illegible]

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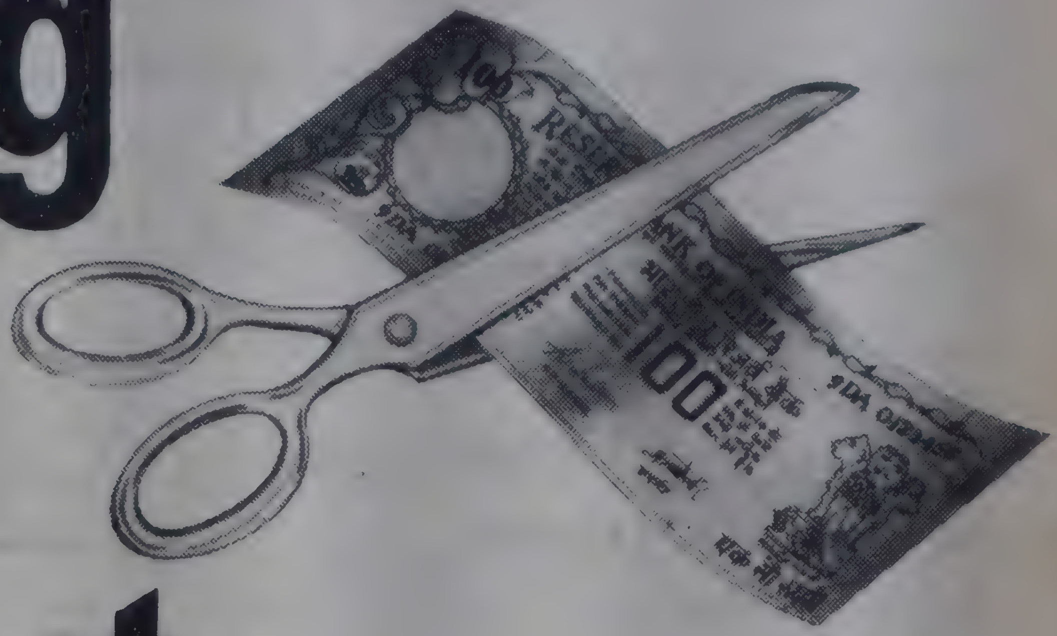

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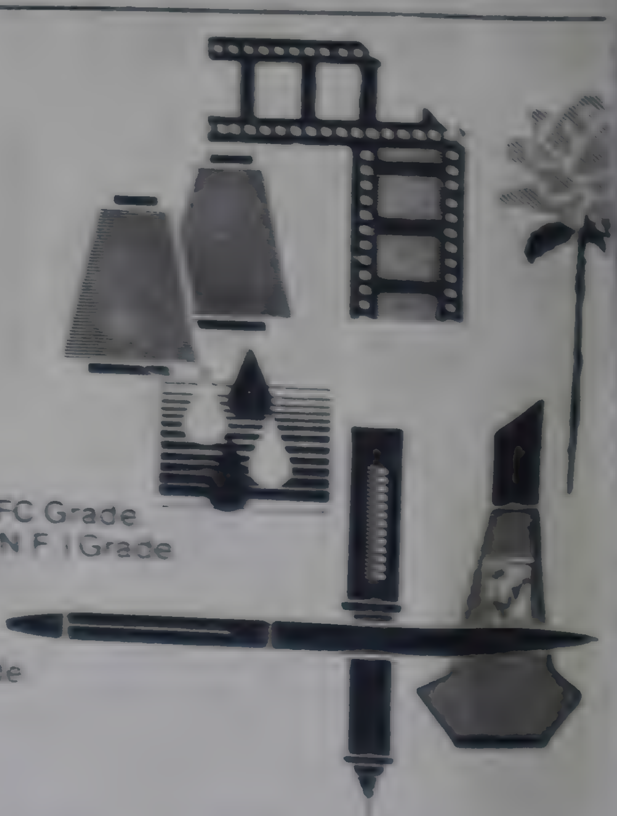

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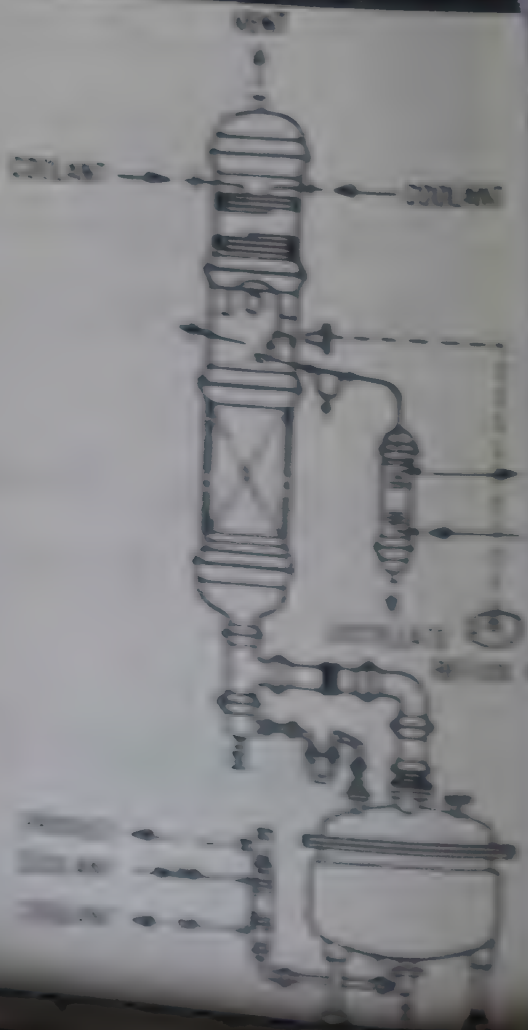

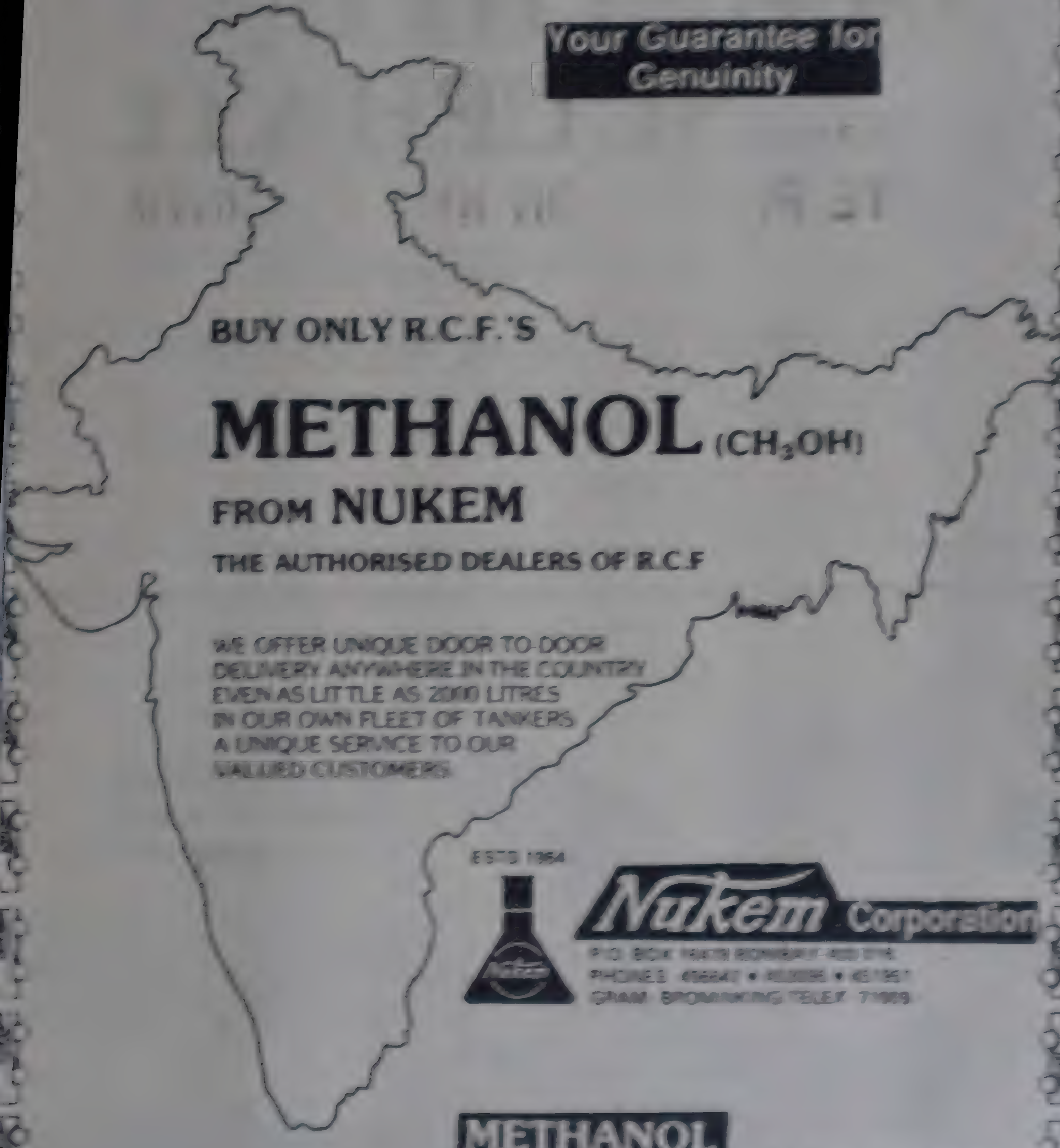

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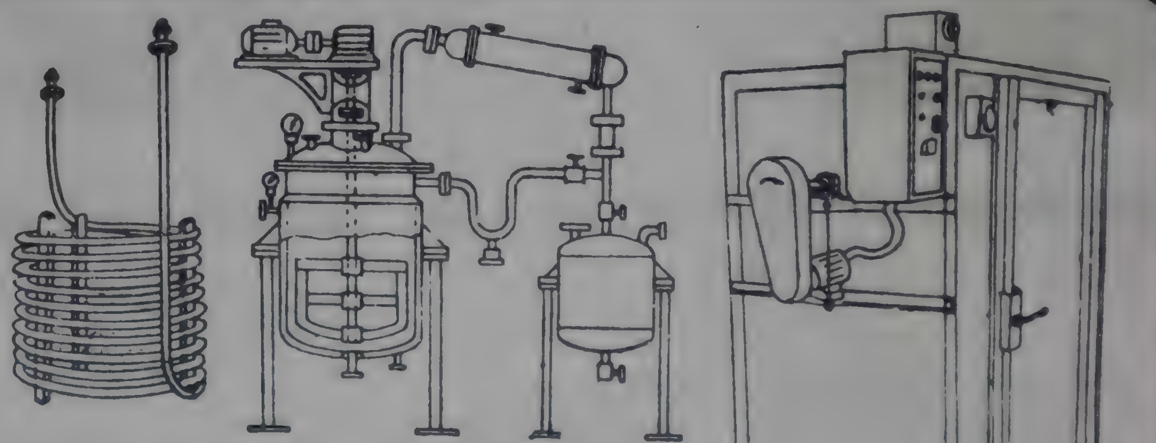

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N – Acetyl p-aminophenol

P – acetaminophenol

P – acetamidophenol

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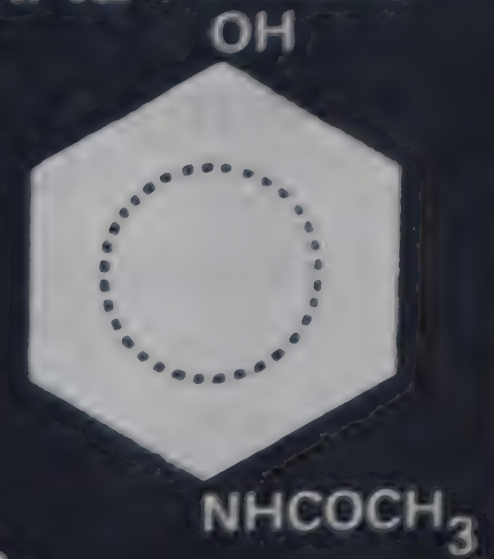

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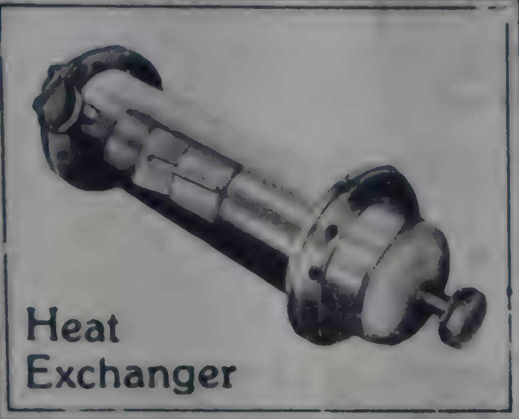

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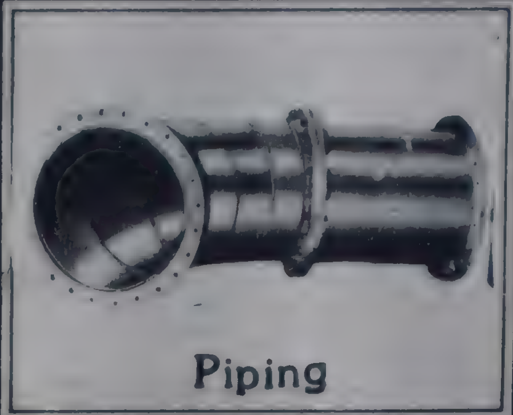

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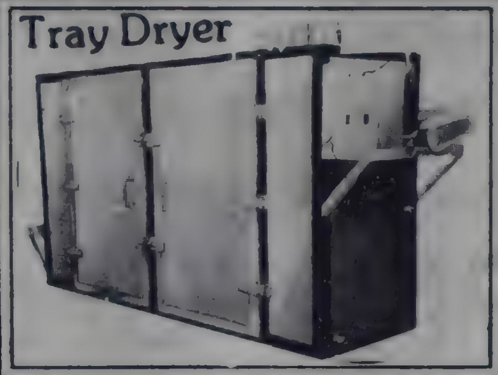

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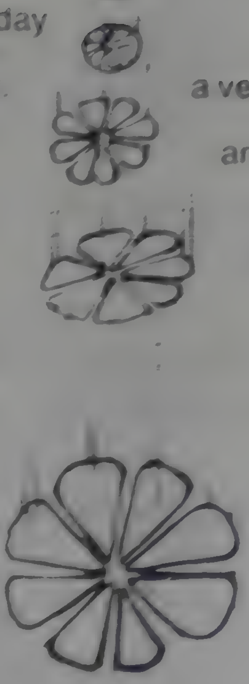

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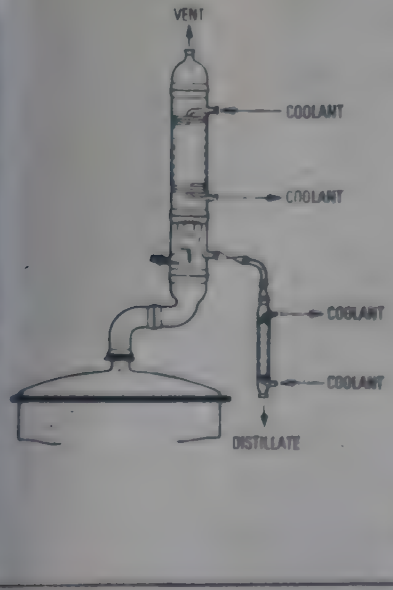

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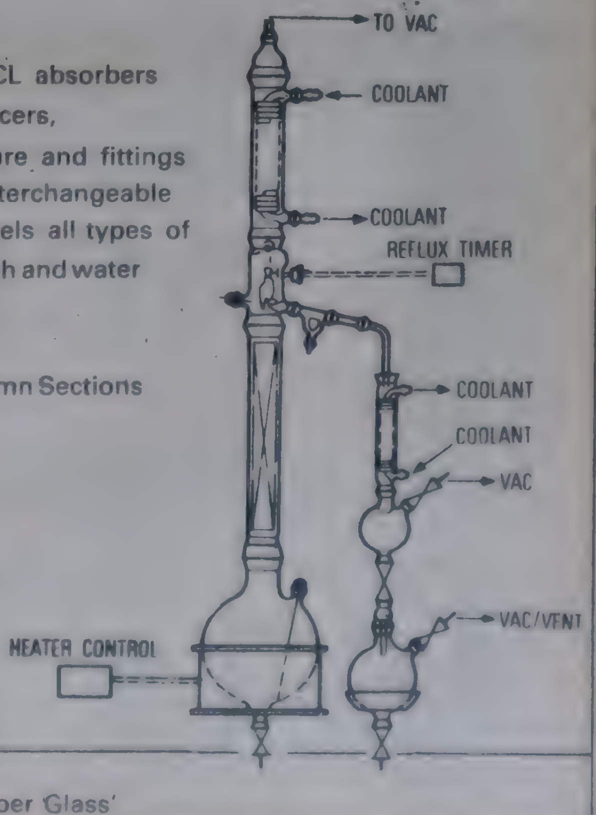

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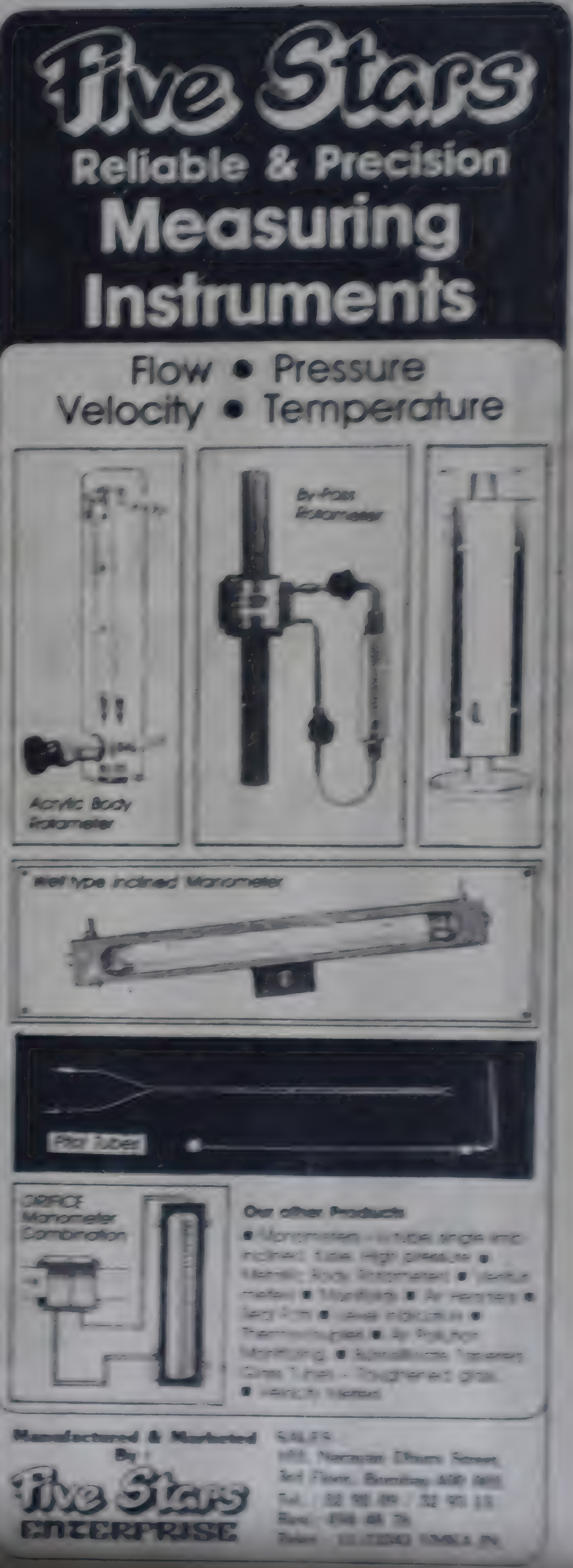

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CHEMICAL
WEEKLY

VOL. XXXIII AUGUST 9, 1988 NO. 47

Wind Energy Scene in India

liminary estimate of wind resource n the country indicates a target in ex- 800 MW for power generation. The gy programme of the Department of ntional energy sources of the Minis- ergy is a broad based one involving ing the wind data base, indigenisation on of new technologies of wind pump- battery charging, and wind electricity

ding to a recent study sponsored by Bank and US Dept. of Energy, India y high among the 29 candidate deve- untries where the potential for wind ems more promising than elsewhere in oping world.

monitoring projects have been taken stations, including wind farm sites, in e States of Gujarat, Orissa, Maharash- l Nadu, Andhra Pradesh, and Rajas- wind monitoring stations have already blished of which 28 are operational (2 Nadu, 8 in Orissa, 9 in Gujarat, 4 in tra and 3 in Andhra Pradesh). The selected are mainly in flat coastal ter-

g 1987-88 wind mapping project- extended to cover Bihar, Gujarat, Pradesh, Orissa, Uttar Pradesh and ngal.

istent and reliable wind data are not for the mountain and hill areas in dif- gions and states including Jammu and and North Eastern Region. Complex udies have been initiated in December the ridge around Talacauvery in West- s in Madikeri district of Karnataka. wind speeds in excess of 25 Kmph have [illegible] round the year, which [illegible] 1.65 MW genera- stration wind farm here. Complex terrain studies have been taken up at Tirumala hills in Andhra Pradesh.

Wind Pumping System:

The National Aeronautical Laboratory (NAL) Bangalore, had worked on the development of WP-2 type wind mill as far back as 1966.

More than 70 units were installed in various parts of the country for propagating the use of wind energy.

Performance monitoring of different types of wind pumps, was continued at the test field of HAL, Bangalore. Both indigenous and imported models are installed at the test field for assessing comparative performance. Certain site specific improvements and modifications have been effected to improve the performance and increase the reliability. The development and testing of hybrid and deep well wind pumping systems are receiving top priority. Four indigenously developed models, namely LGB wind pumps, DWG wind pump, SAMIRA wind pump and an improved design for Gujarat are on trial.

Several proven wind mill systems popular abroad have been identified and three different systems are being procured in small quantities for installation in varying agro climatic conditions in different states.

Sherman's Madurai wind mill adopted from the well-known Cretan Sail wind mills, has been designed to operate in low velocities. It has a 10 m diameter sail rotor coupled with a variable stroke reciprocating pump. Its efficiency is 88% at a rated wind speed of 8 Kmph and it can deliver 18 Kwh/day as a minimum guaranteed average daily output in the rabi season (November to January). Its life ranges from 10 to 15 years.

The Indian Institute of Science, Bangalore had designed and installed a small type SAVONIUS Rotor at Ungra village in 1977. This delivers an average of 2500 litres everyday excluding monsoon months.

A Sail type windmill of 8 m diameter was designed, fabricated and erected at the Central Arid Zone Research Institute, Jodhpur in 1976-77. This wind mill could pump water from a level of 3.5 m at an average rate of 1050 litre/hr. at a mean daily wind speed of 15 to 20 Kmph and 1250 litres/hr at 26 Km/hr.

At Auroville, Pondicherry, three types of wind mills were installed. Banyan wind mill was erected on a 8 m tower and pumps an average of 10 cu. m. of water per day from a depth of 27 meters at an average wind speed of 6 to 8 Km/hour. The TM wind mill ME 2600, was erected and operated efficiently at field conditions. The most recent unit for pumping water at the beach is the Aurobeach wind mill. It has a rotor diameter of 3m with six radiating bamboo sticks and synthetic sails

AMM Murugappa Chettiar Research Center, Madras has developed "Anila" a new wind device with a horizontal shaft sail rotor. Its applications are mainly for water pumping and it is best suited for coastal locations. Palm trees, casurina poles, jute sails and wooden planks — the basic materials required are easily procured from the neighbourhood. With wind speeds of 25 Kmph this wind mill pump discharges 2000 litres of water per hour at a total lift of 8 m. and it can work continuously for 12 hours per day.

Institute of Engineering and Rural Technology Allahabad designed and fabricated Pu 500 water pumping wind mills. The main frame is fabricated out of MS angles, and the inner and outer ring of MS flats. The tower is 6.5 meter high and the cut in speed of the wind mill is 2.5 m/sec. or 9 Km/hr.

Voltas Limited, Bombay have fabricated two prototypes based on designs of Intermediate Technology (IT) development group London. In this the driving reciprocating pump through a system of linkages and transmission assembly, facilitates pumping water from deep, open dug wells, characteristic of Indian conditions. This unit discharges approximately 10,000 to 18,000 litres/hr. against a head of 5 to 6 meters.

The I T wind pump for water supply was originally conceived of and developed by the British registered charitable institution. This was specifically designed to be engineered in workshops of developing countries. This gro has worked on projects in more than sixty cou tries since their founding in 1965. These wi pumps are expected to find widespread acce ance in Nigeria and Zimbabwe.

The cost of water pumping wind mills the country is around Rs. 20,000 and the cut speed is 9 Km/hr. In spite of subsidies by t department of nonconventional energy the un are beyond the reach of the ordinary farm It is reported that some designs available Columbia operate at 5 Km/hr. and may c around Rs. 10,000, if manufactured in India.

1946 wind pumps have so far been insta ed in 23 states and Union territories; out of the 229 were started during 1987-88, Uttar Prade Orissa and Andhra have around 250 wind pum each while Tamil Nadu has 325.

A Regional Wind Energy Test Stati (RWETS) for technology adaptation, perfor ance evaluation, testing and training activit on a regional basis for wind pumps and batte chargers has been set up at Allahabad.

Wind Electric Systems

This station at Allahabad was engaged th oughout the years on the performance monit ing and field testing of 10 units with horizon axis and 5 units of vertical axis, indigenous developed battery chargers throughout the ye BHEL have developed the indigenous design a assembly of the system. A prototype will be stalled at the wind farm at Tuticorin in Ju 1988.

BHEL, Hyderabad, in collaboration with I Madras designed a hexagonal shaped rotor generate electricity to the extent of 1 KW power with wind speeds of about 25 Km/hr. T blades are made of FRP and the generator cou led to the rotor acts as a motor during the sta ing phase.

Jyoti Ltd., Vadodara, has developed ener conversion systems ranging from 40 watt b tery charger to a one KW machine for vill water supply and rural lighting. These syste can also be used for irrigational needs of sm and marginal farms.

50 wind energy chargers of unit capac from 300 W to 4 KW have been imported for t monstration cum field trials. This programme being implemented through REC, and Army Air Force authorities. The demand for wi battery chargers is picking up, particularly defence requirements and north eastern regi and island communities.

(Continued on page

HEMARENA

L. VENKITESWARAN

Alpha Olefines

India is already well up in synthetic deter-ts and linear alkyl benzene (LAB) the base the detergents. Three plants for LAB are operation, two of them recently started. Two re plants are approved and perhaps one or two re may also be cleared. LAB is of course the ermediate of choice for a good range of household detergents but alpha olefines are emerging equally important. Rapidly growing markets ve sparked capacity expansions in US and road and India is yet to get into this area.

The present use of alpha olefines world de is estimated at 800,000 tonnes and this is pected to double in ten years. In the case of pha olefines the use is not confined to deter-nts and there are a range of the alpha olefines varying chain lengths with distinct areas of plication. C_{12} to C_{18} are used for detergents and ese are 30% of the total. The larger offtake said to be for C_6-C_8 alpha olefines for use as comonomers in polyolefines and account for 40% of demand. Plasticiser alcohol, synthetic lubricants and others account for the balance. The present producers and capacities with their projected expansions are given alongside :

CAPACITY FOR ALPHA-OLEFINES TO RISE SHARPLY BY 1991

(all capacity in '000 MT/year)

	Current	Expansion	Completion date
.S			
Chevron	125	125	1990
Ethyl	400	55	1988
Shell	340	240	1989
.K.			
Shell	220	50	1989
apan			
Idemitsu	—	50	1989
Mitsubishi	35	—	—
zechoslovakia	—	100	1991
.S.S.R.	—	75	1990
TOTAL	1120	695	—

ote : Capacity is for C_6 to C_{18} compounds.
ources : Colin A., Houston & Associates,
Industry estimates — CE News, 30/5/88

The principal process in use is based on ethlene and the wax cracking era seems to have ended. Polymerisation invariably leads to the range of products of varying chain length and the success of finding markets for the full range of products has generally resulted in viable operations. The main development in recent years is the growth of market for Hexene-1 as comonomer in linear low density polyethylene. Butene and Octene are also used as comonomers as also 4 methyl-1-pentene from propylene. Hexene is by far more widely used while Butene is also used as comonomer for polypropylene.

Lube oil additives are another area of growth and for these the higher C_{16} alpha olefine is preferred. Also C_{16} olefines are used in synthetic motor oils for which the demand is growing rapidly. The control and distribution of chain length is the most important part of the technology and Ethyl Corporation of USA seems to be top in the field. They claim process flexibility to cater to varying markets and they are also the party not linked to captive use of a bulk of the production.

India has to plan urgently for alpha olefines and increasing use of these for detergents as the need for benzene is avoided. India's use of alpha olefine sulfonates is reported to be 3000-4000 tonnes presently but with a potential of 30,000 tonnes in the next few years. The olefines from vegetable oils has not made much progress and in the increasing tightness of vegetable oils supplies and our happy position on ethylene, the obvious choice is this route to alpha olefines.

Plastics displace wooden packets

One sport in which tradition has completely been displaced is Tennis where the wooden frames for rackets have nearly completely been displaced by polymer composites. This development of less than ten years has made enormous strides in the last 2 or 3 years. The early substitution with fibre glass was not successful but graphite came along at increasingly lower prices — now $20 per pound — and has changed the picture. Over 70% of tennis professionals use composite rackets and the endorsements and promotion efforts have helped in the take-over. Graphite reinforced epoxy is said to be most common but Kelvar aramid fibre has also a share. Composite racket prices range f to 1000 and even aluminium frames relegated to the background.

It is reported that epoxy comp also invading another area of wood- and club-heads. But all-graphite much more costly and progress in cha slow. Baseball bats are also in for an e ge as well but the willow of cricket-ba hockey sticks are not under any th sumably due to the regulations in f guts for tennis racket are not yet in tr synthetics.

Propylene Oxide in S. Korea and India

While India is thinking in terms of the old chlorohydrin process for propylene oxide at a location near Madras using propylene from the refineries at a level of about 15,000 tonnes per year of PO/PG and has yet to take final steps S. Korea is going in a big way for the modern technology of ARCO Chemical who will also invest in the venture. Yukong Ltd. will be the S. Korean partner and the plant will be near Ulsan and make styrene as coproduct. Capacities are 1,00,000 tonnes of PO/PG tog 2,20,000 tonnes of styrene. This reflects of development of S. Korea while we ing far behind with plans to import n a million tonnes of polymers and petr in the final year of 7th Plan. Our ta technology also seems to be selectivel to the extent of choosing discarded where this may not be appropriate

Take Overs

Borg Warner, one of the top producers of ABS plastics, are selling out their chemical business to General Electric (G.E.) for a reported $2.31 billions. The sales of this division was $1.25 billion which when added to G.E.'s sales of plastics makes the latter the number one in special plastics. G.E. has been going in a big way into specialities and partners Union Carb cone project.

Nova Corporation of Canada is the well known Polysar Energy & Ch for $ 1.58 billion. Polysar has not been for some time due to slack in synthet

AIDS – no breakthrough yet

India has been concerned about AIDS—Acquired Immunity Deficiency Syndrome the 'modern' disease and there was the death, first perhaps, due to AIDS with several more infected. The world interest and concern about AIDS is reflected in the fact that the week-long 4th International Conference in Stockholm attracted 7,000 people and 3,000 scientific papers were presented on a wide range of AIDS related topics. There have been advances in the understanding of the molecular biology of the Human Immuno deficiency viruses HIV-1 and HIV-2 and how they interact with the human immune system to destroy it but there is no breakthrough in countering the virus. As per WHO there have been reported [illegible] cases up to [illegible] from 136 countries but actuals may b Efforts to develop vaccines against the not been successful particularly in against a subsequent infection by HIV chimpanzees. A gene which encodes genic protein unique to HIV-2 is report been identified and so also a gene en antigenic protein of HIV-1. There was contrary view on HIV's being the caus but now there are reports of Macaque developing immuno-deficiency throug the first in a species other than hum

One hope is for a simple antibo diagnostic agent that could distinguish HIV-1 and HIV-2 infections. But mon [illegible] are still the only hope against AI

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MRTPC to probe into Indal deals

Indian Aluminium Corporation Limited (Indal) is on the dock on charges of indulging in the restrictive trade practice of offering discounts to promote its sales.

The Monopolies and Restrictive Trade Practices (MRTP) Commission has ordered an inquiry into the company's trade agreements with its wholesalers providing for discounts linked to the sale of aluminium sheet.

The commission has passed the order on the basis of an application moved by the director-general of investigation and registration in the company affairs department, who has taken objections to certain clauses in the company's trade agreements with its wholesalers and has found them as restrictive.

The company's agreement with the wholesalers envisages a discount if the wholesaler lifts a particular tonnage of aluminium sheet from the company. The company, however, reserves the right to make any change in the discount amount or the qualifying target quantity.

As per one such agreement, a total discount of Rs. 700 per tonne will be paid to the wholesaler for a minimum offtake of 250 tonnes of aluminium sheet during 1988. The discount amount will be paid at the end of the contract period.

It has come to the notice of the commission that these terms and conditions are restrictive under Clause (E) of Section 33(1) of the MRTP Act.

The director-general has argued that the terms and conditions of the agreements by their "inherent nature and inevitable effect" necessarily impair competition and thus, it is no longer required under the Act to show any other facts or circumstances. The Act now does away with any further proof, perhaps to avoid waste of judicial and administrative resources.

"Because of their pernicious effect they are conclusively presumed to be unreasonable and illegal" even without any elaborate inquiry as to the precise harm they have caused or the business excuse for their use.

The clauses constitute restrictive trade practices as specified under Section 33(1) of the Act, the director-general has argued.

With effect from August 1, 1984, every agreement falling within one or more of the categories enumerated in Section 33(1) of the Act is deemed to be an agreement relating to restrictive trade practices.

The director-general has also pointed out that the facts and circumstances of the case and an overall reading of the clauses of the agreements indicate that they affect the public interest prejudicially in terms of the test laid down in Section 38 of the Act.

BOYCOTT WILL NOT HIT SALES: GLINDIA

The management of Glindia (formerly Glaxo Laboratories) is confident that the threatened boycott of its products will not affect its sales since the vast majority of its wholesalers and stockists have informed them that they will not pay any heed to the boycott call raised by the Maharashtra State Chemists and Druggists Association.

The company has stated that its business was normal in most parts of the state barring a few pockets where the boycott has been launched.

In a statement, Mr. H. Dhanrajgir, senior vice-president of the company's pharmaceutical division, has assured its consumers to have no concern about shortages of its products in Bombay and other parts of Maharashtra. The company, he said, would make every effort to make the products available under any circumstances.

Meanwhile, a spokesman of the Maharashtra unit of the All India Organisation of Chemists and Druggists (AIOCD) made it clear that the state unit has not issued any specific call of boycott although the chemists and druggists in Maharashtra were covered under the national level call of boycott. The spokesman also said that at the recent meeting of AIOCD at Calcutta, the decision to boycott Glindia products was taken with nine states versus six states on the call decision. It appears that there is a confusion prevailing among wholesalers and stockists in the state.

Several Glindia wholesalers and retailers said that they will prefer to wait and watch the developments.

NALCO MAY ACHIEVE RATED CAPACITY IN 1989

The second stream of the public for National Aluminium Company's mine refinery has started regular duction.

The 800,000-tonne refinery is e ted to achieve the rated capacity year.

The refinery produces "sandy alumina based on atmospheric d tion technology ensuring good q and low energy consumption.

It will supply 425,000 tonnes alumina to the company's 2.18 tonne smelters, located 700 km at Angul in Orissa, for making a nium metal. The balance of 37 tonnes is earmarked for exports.

The output record of the refiner been satisfactory. Against a targe 540,000 tonnes for the current fina year, in the April-June quarter 101,000 tonnes of calcined alu has been produced.

Accelerated production at the r ry and buoyancy in the global m may boost the company's exports has already bagged orders for 3 tonnes. Out of this 110,000 t have already been exported in six ments.

NALCO has already earned fo exchange worth Rs. 23 crores d the current financial year. The is likely to go upto Rs. 100 cror year-end.

NO SOLUTION FOR UC IN SIG

Union Carbide India's efforts to relocate or to effect closure of Chembur plant in Bombay has met no success. According to Mr. Gokhale, chairman and managing tor, the company is continuing it orts to find a solution to this ext ly complex problem.

Mr. Gokhale has pointed out the company's management has ted several programmes for techn upgradation, control on avoidable export diversification and business velopment analysis for enhancing long-term viability of the comp

The company has received an order for leather goods valued 14 lakhs during the six months current year. In addition, firm inq have been received for engin components, chemicals, reactive and intermediates and the co expects to achieve export sales of Rs. 1 crore for the year.

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Sumitomo deal irks ONGC, Gail

The Oil and Natural Gas Commission (ONGC) and the Gas Authority of India Ltd. (Gail) have taken exception to the payment of remuneration by Sumitomo Corporation to Jindana Holding for helping the Japanese bag the deals, especially as its action is contrary to the contract signed with the commission. The Gail is also reported to be moving in these lines.

While there is no ban on the appointment of Indian agents by foreign contractors dealing with ONGC, OIL or Gail contracts, certain guidelines have been issued relating to their role. According to these guidelines, wherever foreign contractors employ Indian agents, the commission paid to them has to be made in non-convertible Indian rupees. As a matter of fact, the sources explain, the sanction issued by the government for the release of foreign exchange clearly indicates the total amount to be paid in non-convertible Indian rupees to the Indian agent.

In fact, the instructions that have been issued to public sector undertakings like ONGC are that as far as possible, there should be direct dealing with manufacturers or suppliers. It is mandatory for the foreign supplier to indicate whether he has an agent in India, the scope of jobs to be performed by the agent and payment to be made to the agent. The payment of the Indian agent's commission is always made in non-convertible Indian rupees.

It is clear from information available that neither Gail or ONGC dealt with any agent or consultant. The Sumitomo Corporation had never indicated in its bids that it had any Indian agent. One of the clauses of the purchase order of July 15, 1988 placed by Gail on the Japanese consortium reads "Indian agent and commission: There is no Indian agent".

For the purchase from the Japanese consortium the payment was made by Gail to the supplier as per the OECF (Overseas Economic Cooperation Fund) procedures and no payment was made to any Indian agent.

Similarly, there was no indication by the Japanese in their bid, or subsequently at any stage, that there was an Indian agent in regard to the purchase of casing pipes by ONGC. No payment by way of commission or of any other nature was made to an Indian agent as the commission.

In the case of the Gail order, it was in April 1984 that Engineers India Ltd., consultant to ONGC, invited global tenders for the procurement of line pipes of different sizes. The processing of the bids was passed on to Gail which was informed in August 1984 to execute the HBJ pipelines.

In a separate development later, the Union government had secured an OECF credit in December 1984 for this pipeline project. As per the OECF guidelines, only a Brazilian party and a Japanese consortium could be considered if India was to avail of the credit.

Though the offer from the Brazilian party was the lowest, it was decided to split the order between the Brazilians and the Japanese consortium, as per the following considerations: (1) The Brazilian party, namely, Petrobras/Interbras, Brazil, had only one pipe mill against four of the Japanese consortium. (2) Originally, the Brazilian company had offered an extended delivery schedule which was subsequently altered radically to suit the project. Besides, its source of steel was located 1,500 kms away from the pipe mill. Therefore, timely supply was doubtful.

Accordingly, on the basis of these considerations, it was decided to split the order between the two parties. This was approved by the then petroleum minister. It was also decided that further price reduction should be negotiated with the Japanese consortium.

In the course of the negotiations for reductions in price, the Japanese offered 11 per cent discount on their FOB price, provided 60 per cent of the order was placed on them.

Following the approval of the finance ministry, the placement of the order was worked out as — Sumitomo Corporation: 1.52 lakh tonnes at 184 millions; Brazilian firm: 1.01
at $51 millions.

As regards the ONGC pur
commission had, in March
ed a global tender for five
ing pipes in different sizes
to meet its off-shore requir
offer from the Sumitomo
the leader of the consortium
Mitsui Corporation, Mitsubis
tion, Marubeni Corporation
tsui and Company was the
cordingly the order was plac

RISING DEMAND: COAL IN
HARD PRESSED

The coal industry is
against the increasing dema
wake of fast industrial exp
the country.

According to an official es
demand for coal was estima
to 417 million tonnes by
the century.

The demand for raw coal
assessed at 325 million
1994-95 alone.

In order to match the
mand by 2000 AD produc
have to be nearly double
Plan target of 223 million to
1990.

The production of coal,
said, was, however, 165.7
1986-87 against the target
m.t. Till December 1987,
however, achieved a product
m.t. out of the targeted 183

In order to meet the 200
mand, the raw coal produc
have to be raised by 19.1
ly after 1990.

PESTICIDES PRICES

According to Pesticides
Association of India cyperm
mical is available at Rs. 1,
now and cypermethrin 25 p
at Rs. 450-501 per litre.

The price of Rs. 2,200
cypermethrin technical and
Rs. 600 per litre for cyper
per cent EC were preva
which subsequently have

re rejects plea to hike Haldia refinery capacity

ion Government has rejected
Bengal Government proposal
Indian Oil Corporation (IOC)
d to raise the capacity of its
finery either in the remaining
he Seventh Plan or in the Ei-
.

communication to the State
ent late last month, the Union
ent informed that the capacity
n proposal had been drop-
he grounds of high cost. IOC
posed that the refining capacity
nded from 2.5 million tonnes
to five plus million tonnes a

rding to State Government sour-
Union Government felt that the
capacity expansion, as propos-
IOC would roughly equal the
a "grassroot level" plant.

entally the capacity expansion
l was first mooted by IOC in
which later led to the preparation
ect reports many a time on the
at the proposal would be trea-
ourably.

983. there was a strong feeling
e capacity expansion proposal
e through, as the Centre repor-
asked IOC to modify its project
It also asked it to highlight cer-
pects in the modified report.

ordingly, IOC modified the re-
egging the cost at Rs. 600 plus
on the basis of the price line
ng then. The State Government,
had nursed the hope that the
l would come through in the
Plan was disappointed as the
had committed itself in relation
Karnal, Mangalore and the pro-
Assam refineries.

as apparent from the Centre's
that the expansion of the capa-
f Haldia refinery would not en-
's attention during the Eighth

cording to sources, the background
prepared by the Ministry, in con-
on with the oil companies, and
he committees working to ascer-
ia's petroleum products de-
did not discuss the issue.

Significantly, the Centre's decision came at a time when a techno-economic survey, done by the Petroleum Ministry, had indicated that the demand for petroleum products in the region would register a spurt in the coming years. The State Government would take up the issue with the Centre shortly.

GAIL'S OFFER TO HSEB PROJECT

Gas Authority of India Ltd. (GAIL) has decided to partly finance a Rs. 270-crore gas-based power project to be set up jointly with the Haryana State Electricity Board (HSEB), Faridabad.

This was disclosed by the State Industries Secretary, Mr. Tirlochan Singh, at a meeting organised by PHD Chamber of Commerce and Industries (PHDCCI) in New Delhi recently.

Details of financing this 216 mw power plant are, however, yet to be worked out. The project is slated for completion in two years' time.

Mr. Singh further disclosed various measures being adopted by the State Government in view of the new industrial policy announced in April.

The State Government has decided to earmark Rs. 8.5 crores against Rs. 60 lakhs for subsidy on diesel generating sets by industrial units. Subsidy on DG sets has been increased to Rs. 15 lakhs from Rs. 50,000, under the new industrial policy, Mr. Singh added. He assured full Government support for meeting the power crisis in the State.

In response to a query raised by the PHDCCI President, Mr. M. M. Sabharwal, regarding calculation of concessions available under the sales tax department or the sales tax exemption scheme, Mr. Singh clarified that the definition of fixed capital investment included the cost of plant and machinery, cost of imported second-hand plant and machinery, technical know-how fees, payment to collaborators and similar expenditure.

Mr. Singh further stated that eligible industrial units will be entitled to opt either for the sales tax exemption scheme or the sales tax deferment scheme.

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CAG raps BPCL for discrepancy

The Comptroller and Auditor General of India (CAG) has criticised the Bharat Pumps and Compressors Limited (BPCL) for "indicating different capacities to different authorities on different occasions."

In its report on the performance of BPCL laid in Parliament, the CAG said according to the project report, pumps and compressors division has the capacity to manufacture 660 centrifugal pumps, 65 reciprocating pumps and 60 reciprocating compressors, which in terms of quantity was stated as 6,000 tonnes.

But in June 1987, ministry said though there were difficulties in assessing the capacity of a jobbing industry where every product is tailor-made, the company had taken the capacity of this division as 475 centrifugal pumps, 210 reciprocating pumps and 52 reciprocating compressors, taking 1982-83 as the year of break-even operation.

The report said no data for machine utilisation was available till March 1980 and the actual machine utilisation during 1980-81 to 1985-86 ranged between 63 to 78 per cent.

While data for labour utilisation in the fabrication shop, heat treatment shop and assembly shop was not available, the overall utilisation of labour in the pumps and compressor division as a whole ranged between 64 to 80 per cent during 1980-81 to 1985-86.

The CAG report assailed the BPCL for the delay in executing contract. A test check in audit of supplies made during 1982-83 to 1985-86 revealed that there were delays ranging from one month to 33 months and four months to 74 months in the execution of orders for reciprocating pumps and compressors respectively.

As such the company had not only incurred higher expenditure on manufacture but also had to bear liquidated damages amounting to Rs. 116.35 lakhs upto end-March 1987.

While the norms of ministry of industry had laid down that in a jobbing industry, labour efficiency on an average ranged between 50 and 55 per cent, the efficiency of labour varied from 37 per cent during 1980-81 to 52 per cent in 1985-86 in the BPCL.

The report noted that though the revised profitability analysis for gas cylinders project envisaged the use of steel billets for the manufacture of gas cylinders, the cylinders are being manufactured mainly from seamless tubes, thereby leading to under-utilisation of facilities already created. The idling of piercing and draw processes was valued at Rs. 510.08 lakhs, the report said.

On BPCL's diversification into the production of carbamate and ammonia pumps, the report said though the project began production in end-December 1982, "with the low level of orders so far received and executed, the capital investment is likely to prove unremunerative."

Against the total manpower of 1,500 envisaged in the project reports for pumps and compressors division and gas cylinder division, total employees roll rose from 1582 in 1980-81 to 2002 in 1985-86.

Value added per rupee of remuneration paid to an employee was 3.09 in 1982-83 which decreased to 2.68 in 1985-86.

The report criticised the BPCL for not preparing any cost accounting manual so far.

It said the company had been incurring losses since inception except during the years 1982-83, 1983-84 and 1985-86.

Till end-March 1986, the accumulated losses of the company amounted to Rs. 1369.73 lakhs even after taking into account the financial reliefs aggregating Rs. 866.90 lakhs doled out by the government during 1979-80 to 1983-84.

The losses were due to "delay in commissioning the projects, low capacity utilisation, excess manpower, poor labour efficiency, excessive rejection and heavy book debts."

DCM TO RECEIVE MORE BIDS FOR KOTA COMPLEX

The board of directors of DCM Ltd. deferred discussions on the sale of the Kota complex until more bids are received by the company.

It is reliably learnt that besides Mr. Oswal, the Tatas and the Birlas are keen to buy these units. Bids are being submitted on their behalf.

The last date for submission of offers has been extended to August 10 on request from potential bidders. It is reported that some of them have sent evaluation teams to Kota and the process of assessment and finalisation of bid prices will take some time.

The decision to invite bids w en in an earlier board meeting It was learnt that Mr. Odhey Osw evinced interest in purchasing th complex consisting of fertiliser, cal and cement units. The bo sisted on open tender in order t competitive bids.

The board of directors are ex several bids as the Kota compl turn out to be an attractive inv proposition.

Lack of working capital and conditions in the cement and markets have forced the comp the red.

The rationale for selling the complex is the severe working squeeze faced by DCM.

GOHSENOL GH-17 PRICES SHOOT UP

Prices of gohsenol GH. prime raw material used in manufacture of Sewcol and Bio-yarn processing, have up sharply during the last c of months owing to acute s age in the international ma

According to market sou prices of gohsenol GH-17 almost doubled from Rs. 75 kg, quoted in May to Rs. 14 kg at present and is quoted er at Rs. 150 per kg in for trading for August.

Traders pointed out that main reason behind this sp strong overseas market con world-wide shortage and m of import advance licence. present, Indian consumers importing this material again advance licence from Japan, said.

However, some traders are eligible for advance li and importing this material out paying the import duty 245 per cent, are not re-ex ing them but stocking at godowns, they pointed out.

Further due to these activ the premia of advance li have gone up considerably are placed today at around per cent. On the other h one of the biggest ethylene plants of Japan has stopped duction creating shortage in Japanese market, the main ce of import.

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(Continued from page 34)

Five wind farm projects of aggregate capacity 4.28 MW have been operating successfully at Okha and Mandvi in Gujarat, Tuticorin in Tamil Nadu, Puri in Orissa and Deogarh in Maharashtra. About 97 lakh units of electricity have been pumped to the main grid. The four 550 KW project at Okha, Deogarh, Puri and Tuticorin are being expanded to 1.1 MW each. These projects are all based on 55 KW units.

A 1.35 MW wind farm based on 15 numbers of 90 KW wind electric generators at Kayaltam in Tamil Nadu has commenced operation recently. Projects of 2.0 MW aggregate capacity have been taken up in the States of Andhra Pradesh, Karnataka, Madhya Pradesh and Goa based on average unit size of 100 KW. A total wind farm capacity of 9.4 MW is expected to be established in 1988 with 138 machines.

10 stand alone wind electric generators system of capacity 10 KW and 25 KW are expected to be installed for demonstration and field trials in remote, inaccessible areas.

International cooperation in the field of wind energy is forth-coming from many countries. A 5 KW Aerowatt wind battery charger has been installed at Maidhan in Bhavanagar district of Gujarat under an Indo-French collaboration programme.

The design and fabrication of a 20 KW vertical axis wind turbine has been completed under the joint Indo-FRG project. The same is under installation at Coimbatore district of Tamil Nadu.

A pilot project comprising 4 wind electric generators of 90 KW unit capacity, under grant financing from DANIDA is under implementation. The Denmark financial assistance will also be expected for a 20 MW project for Lamba near Porbander in Gujarat and two 5 MW projects in Tamil Nadu.

Electricity can also be generated by using a wind pump to lift water to a storage reservoir from which it can be subsequently released through a hydroelectric turbine. This type of system with a suitable sized storage reservoir can produce power continuously on demand and will be independent of variation in speed.

There is still a considerable vol
gineering knowhow to be developed
wind energy. The cost of genera
five wind farms range from Rs. 1.14
but the state electricity boards are r
pay even Re. 1/KW.

Several private sector manuf
Madras, Coimbatore, Pune and in Utt
have taken up the fabrication of w
and the public sector giant BHEL ha
lead.

Several foreign companies are en
agreements with well known ma
companies in India for indigenous m
of wind electric generators, which a
be achieved within the Seventh p
During this year 1987-88, an appl
collaboration for the manufacture
unit size wind electric generators ha
proved. The current import policy a
mits duty free import of wind energy
This has been extended to cover imp
ponents and accessories to accelerate
production.

The report of the World Bank
India, submitted recently has high
potential of wind power and indicate
sibilities of Bank assistance in this ar

A mission comprising of US win
representatives, sponsored by the
Wind Energy Association visited Ind
February 1988 to explore the pos
technology transfer of wind energy
to India.

The budget provisions for the W
programme for 1987-88 was Rs. 7 cr
crease of one crore over the 1986-87

T.P.

Sources :

(1) Wind Energy programme ann
(1987-88)—Department of Non-c
Energy Sources, Ministry of En
Delhi.

(2) Feasibility of Wind Energy in In
A. Jagadeesh, The Hindu —

ack to industry's molasses export plan

vernment plan to export four
es of molasses this year is
to suffer a set-back because
ndifference of a Bombay-based
here the storage space owned
the various ports with the su-
stry.

rm has handled molasses ex-
a number of years on behalf
State Trading Corporation of
TC) and enjoys near monopoly
storage capacity available at
ral ports in the country.

rding to informed sources, the
ndustry which has taken upon
e responsibility of undertaking
s exports this year at the ins-
f the Government has made se-
fforts to convince the firm to
th the surplus storage space
e with it but without any tan-
sults so far. In the absence of
e storage tanks at the ports,
ort efforts are bound to suffer.

decision to export molasses
en by the Ministry of Industry
rtment of Chemicals and Petro-
als) following a series of meet-
ith STC. The canalising agency
has handled molasses exports
expressed its inability to under-
xports this year fearing losses
deal. The sugar industry, re-
ed by its two organisations —
an Sugar Mills Association and
l Federation of Co-operative
Factories Ltd — however, offer-
ake up the challenge.

wing the decision, the Depart-
f Chemicals and Petrochemicals
sed the industry through its ex-
ganisation, Indian Sugar and
l Industry Export Import Corpo-
Ltd. (ISIEC), to export four
nnes of molasses, to start with.
ommunication allowing exports
sued on June 15 this year and
en ISIEC as well as the two
odies have been busy finalising
ements for exports of molasses.
understood that arrangements
lready been finalised for under-
exports from certain ports in
st and the west coast. Move-
f molasses for exports to these
s about to begin shortly.

ever, ISIEC is facing difficulties
sing arrangements at certain
e and the Bombay-based com-
s monopoly over the tanks
[illegible] for storing molas-

STC hitherto had been operating only through this exclusive handling agent over the years. It used to only finalise export sales to the foreign buyers and entrusted the whole work of procurement, transport, storage, shipment, etc. to this company.

This year, following appreciable increase in sugar production, there is also a glut of molasses. Unlike sugar, the lifting of molasses has not kept pace with the increase in production because the demand from distilleries which are its main users, has been slack. Efforts to export alcohol — (a value-added item so far as molasses is concerned) have been abortive as the world price of alcohol is much lower than its cost of production in the country. Exporting molasses is also a losing proposition this season and this is why STC opted out of this.

Because of the glut, several factories have been forced to store surplus molasses in Kutcha pits. The molasses stocks as on March 15 this year were put at 26.90 lakh tonnes, 50 per cent higher than the estimated stock of 18 lakh tonnes on the corresponding day last year. By April-end, the stocks had soared to 37 lakh tonnes, representing almost the whole season's production in a normal year.

DELAY IN ISSUING ST CERTIFICATE HITS SMALL DRUG UNITS IN BENGAL

A large number of small-scale drug units registered in West Bengal have been compelled to submit quotations for the state labour department ESI (MB) tender for drugs for 1988-89 which closed on July 16, 1988, without the required sales tax clearance certificate as these were not available from the commercial tax officer.

According to a press release issued by the West Bengal Small Scale Drug Manufacturers and Traders' Association, as a result of this, these tenders may be disqualified and the units will be deprived of any business from ESI (MB) authorities during the next tender period which may be for three to five years. This would spell disaster for the units, the association feels.

In a letter to the state finance minister, Dr. Ashim Dasgupta, the association has pointed out that drug units are facing several problems including a shortage of working capital and higher cost of raw materials.

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Ranbaxy Lab plans Rs. 17 Cr. expansion

Drugs and pharmaceuticals manufacturer, Ranbaxy Laboratories Ltd, (RLL) is going in for a major expansion plan involving a capital outlay of Rs. 17 crores. The plan is in keeping with its goal of overseas expansion.

In order to raise funds for the expansion programme and to meet part of the working capital requirements, the company is offering 12.5 per cent secured fully convertible debentures of Rs. 100 each for cash at par.

The break-up of the issue is as follows: (a) To equity shareholders on rights basis in the ratio of 30 debentures for every 100 equity shares (including bonus shares for 1988) Rs. 1,585.50 lakhs, and (b) Reservation for employees Rs. 79.28 lakhs. The company intends to retain oversubscription up to 15 per cent of the total issue.

According to the RLL Chairman-cum-Managing Director, Mr. Bhai Mohan Singh, the company is currently in the process of finalising transfer of technical know-how for the production of basic drugs and pharmaceuticals to Afghanistan, Kenya and Jordan. It has already entered into marketing tie-ups and licensing agreements with Cameroon, Oman, Sri Lanka and the United Arab Emirates. These apart, the company has four successful joint venture operations in Nigeria, Malaysia and Thailand.

RLL has enhanced its international presence with a long-term focus on several potential markets, according to Mr. Singh. At present, its exports cover more than 30 countries in western Europe, south east Asia, west Asia, the Far East, Africa and the USSR. For its outstanding export performance, the company has been honoured five times by Chemexil in the last six years.

The areas of a bulk drug plant for the manufacture of two new drugs — ranitidine and cephalex expenditure of Rs. 8 in its existing plant c manufacture of pharma cal dressings and diag crores) and the install ment and facilities at tre, computerisation an expenditures (Rs. 5 cr

The company has a pacity for bulk manufac neration drugs, ranitidi cin through in-house res lopment and subsequer sation. It has also obt nal process patents fo pharmaceutical substan

RLL has five moder with an investment of crores. These are loc (two plants) Chandiga Punjab) and Okhla (in plants have been accr World Health Organisa good manufacturing basic drugs plant at T inspected and approve and Drugs Administrat The Dewas complex in is being readied for early next year. Thes further open a new m for both basic drugs a according to the com ment.

The major drugs be by Ranbaxy at present Norbactin, Histac, Gra and Calmpose.

The company has u mission of production tial drugs and has eme est producer of ampici cephalexin, cotrim ranitidine and diazepa At present, Ranbaxy La third largest pharmace turing company in the

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PERSONALITIES

R. VENKAT

Mr. R. Venkatesan, of Rashtriya Chemica Ltd., Bombay, has be chairman of the Ferti of India,

Dey's group plans new drug unit

s medical group is in the
acquiring land at Behala for
e of setting up a new unit
r manufacture Trimethopre-
and Sulpha-Methoxazole.
will be provided in the
new unit for expanding
duction of some of the
drugs like Chloramphenil
r and Palmitate. The capital
e project is yet to be worked

tion of Chloramphenicol by
edical Stores (Manufacturing)
L), suffered during 1987 due
n import cost of the basic
lting from appreciation in
ue as well as an import duty
er cent. Following the expiry
s for this drug in February
ction of it now remains sus-
The Union government is yet
decision on the company's
for renewal of licence.

oup's turnover, was expected
Rs. 50 crores in 1988, which
about Rs. Five crores more
previous year, according to
director Bhupen Dey. While
g shareholders of DMSL at
AGM held in Calcutta re-
Dey said the company, du-
had made a marginal profit
05 lakhs on a turnover of
Rs. 24.57 crores which was Rs. two crores more than the preceding year. However, it ended the year with a loss of Rs. 2.09 crores which accrued to it following the amalgamation of Dey-Se-Chem (DSC) with it. DSC's accumulated loss was Rs. 2.08 crores before the amalgamation which became effective from July 1987. Dividend, as a result, was skipped by DMSL against 10 per cent paid for the previous year.

The amalgamation with DSC has put DMSL in a tight spot. In order to pay the secured and non-secured debtors of the former, the company had to utilise a portion of its reserve fund amounting to Rs. 2.06 crores, thereby reducing its reserves to Rs. 12.8 lakhs which, in turn, resulted in 50 per cent erosion in its net worth amounting to Rs. 21.3 lakhs. Owing to non-payment of income tax for the assessment years of 1985 and 1986 under Section 72 (A) of the Income Tax Act, 1961, the company's total tax-liability amounts to Rs. 88.31 lakhs.

Besides the common reasons for the low margin on drug prices despite the recent revision of Drug Price Control Order, Mr. Dey stated that the group had to put up with another constraint. Due to the closure of the Rishra factory of Hindustan Glass Works (which was its major supplier of glass and bottles) for the last three months, DMSL alone had to bear an extra cost of Rs. 20 lakhs on account of transport charges for importing them from UP and Haryana. In fact, due to high freight rates coupled with non-availability of bottles, said Mr. Dey, Dey's Medical Stores had to curtail production of Keo-Karpin worth Rs. Four crores last year.

As part of its diversification programmes, DMSL in 1987, had introduced three ayurvedic products under brand names of "Herbodil", "Prostina" and Keo-Karpin antiseptic cream. The company has received enquiries from the Soviet Union for its ayurvedic existing medicine.

HA PENICILLIN PLANT LAUNCHED

Mr. H. K. Khan, secretary, department of chemicals and petro-chemicals, commissioned the rotary vacuum filter-5 of penicillin plant of the public sector enterprise Hindustan Antibiotics Ltd, (HA) in Pune recently.

Mr Khan also expressed satisfaction at the progress of the penicillin expansion programme and improvement shown in the working of the gentamycin plant. He commended the workers and staff for achieving 35 per cent increase in production and sales this year.

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Govt. rapped for poor funding of IDPL

four-member committee of the Medical Association (IMA), to the working of the public sector Drugs and Pharmaceuticals Ltd., ical of the Union Government for providing the company with ade- financial support.

e committee headed by Dr. K. K. IMA president. recently visited 's plant at Nandambakkam in sub- n Madras. It had earlier visited plants at Gurgaon, Rishikesh and rabad.

committee members said that Union Government, after having set IDPL for enabling the public sector play a predominant role in the drugs pharmaceutical industry, had failed utilise it. Given the high power pub- ity campaigns which the multinatio- and private drug firms were capa- of, the lack of Government patron- e had resulted in IDPL not being able work at full capacity. Consequently ere were heavy losses.

It was pointed out that the retrogra- step of delicensing the manufacture as many as 84 of the 93 drugs help- multinationals make deep inroads to industry. As a result out of the s. 2,284 crore drugs and pharmaceu- cal production in the country, the are of multinationals and private sec- r giants had gone up further.

The Government should extend ac- ve support and encourage IDPL to use s fullest capacity. as the products anufactured by it are of high quality, e committee members said.

Referring to the Madras plant of DPL, which is primarily engaged in anufacture of surgical instruments d equipment, the committee has suggested the setting up of a division for e manufacture of fibre optics equip- ment which is being imported. It was oped that this would be undertaken y the company in the near future.

Dr. Shah and another member of he team, Dr. M. C. Garg, chairman f the therapeutics and appliances com- nittee of IMA, said that manufacture nd sale of sub-standard and spurious rugs are the bane of the drug industry.

IMA has repeatedly recommended to e Government the abolition of the an licensing system, which to a great xtent, is responsible for the influx of ubstandard drugs, but the Government has taken no action at all in this regard.

DUTY RELIEF FOR SELECT GOODS

The Government has announced modification in the rates of customs and excise on certain commodities.

The duty on 2,6 diethyl aniline when imported by actual users for manufacture of butachlor has been reduced to 25 per cent. There will be no auxiliary duty on such imports. The customs duty on butachlor has been reduced to 45 per cent.

Five pesticide intermediates — chloro acetyl chloride, methane bromide, P. methyl mercapto-m-cresol, cyanuric chloride and chloro-2,6 diethyl-n-(chloromethyl) acetanilide — have been exempted from countervailing duty.

Also the basic customs duty on six pesticide intermediates has been reduced to 15 per cent. They are: orthoamine phenol, chloro acetyl chloride, methylene bromide, P, methyl merca to-m-cresol, cyanuric chloride, an chloro-2,6 diethyl-n-(chloromethy acetanilide.

Duty on all goods required for th purpose of maintaining of computer and computer peripherals has been re duced to 50 per cent advalorem an the additional duty has been reduce to 10 per cent.

Another customs notification sai that the auxiliary duty will be leviabl at 30 per cent on spare parts of computers and computer peripherals.

The excise duty on copper coated steel strips has been reduced to Rs. 1,500 per tonne.

An excise notification said that the general small-scale exemption scheme has been made applicable for packet tea also.

Valuation Rule: The revised Customs Valuation (Determination of Price of Imported Goods) Rule, 1988, will come into force from August 16.

The revised rules will be applicable to all imported goods where a duty of customs is chargeable by reference to their value.

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Butanol producers call to halt imports

Manufacturers of butanol from alcohol have sought curbs on imports in view of their mounting inventories.

National Organic Chemical Industries Ltd. (NOCIL), Somaiya Organics and Kashipur Sugars have a total installed capacity of 19,500 tpa. While NOCIL follows the naphtha route, the other manufacturers follow the alcohol route.

The demand for butanol ranges from 15,000 to 17,000 tpa. In view of the shortfall in domestic production, the Government had allowed actual users to import 40 per cent of their requirement. Accordingly, licences were issued for imports of about 4,000 tonnes of butanol and isobutanol.

Large consumers like Indian Petrochemicals Corporation Ltd. (IPCL), Indian Explosives and some big paint manufacturers have made use of the facility to import both butanol and isobutanol. Local butanol is quoted around Rs. 30 per kg. (NOCIL's price is cheaper) as against Rs. 27 for the imported product.

An industry source traced the problem to the cyclical supply of molasses. This had necessitated imports and this year, abundant supply has led to increased production of chemicals. The industry is now holding an inventory of around 1,200 tonnes, according to industry sources. Some consumers are also said to have switched on to alternative solvents.

The Government could help ease the situation by stopping issuance of further import licences or order a temporary ban on import of butanol and isobutanol, it is felt. This will not only save foreign exchange but help some of the manufacturers who are nursing large inventories.

Substantial addition to indigenous capacity is under implementation. In Uttar Pradesh, an alcohol-based unit has been granted licence for setting up a 10,000 tpa Butanol plant. In Maharashtra, a co-operative sugar factory is setting up a 4,500 tpa plant and an associate of Andhra Sugars has been granted a capacity of 6,000 tonnes for butanol and octanol.

KOTHARI SUGARS PROJECT FOR POLYBUTENES

Kothari Sugars, flagship company of the H.C. Kothari group of companies (Madras), is entering the petrochemical field by setting up a new project for the manufacture of polybutenes. The project will manufacture 5,000 tonnes per annum of polybutenes of different grades. It is a Rs. 16-crore project being set up in the Manali petrochemical complex near Madras, in technical collaboration with Cosden Technology Inc. the US, part of American Petrofina, a Rs. 15,000-crore chemical giant.

Polybutenes are used extensively in variety of automobile and electrical applications. A major application is as additive for highspeed lubricating oils required for two-wheelers.

Another application is in telecommunication. Polybutenes are standard additives for jelly-filled compounds which are a prime requirement of the telecommunication cables.

Polybutenes are also used in a wide range of chemicals and consumer articles such as inks, paints, adhesives, sealants and leather finishing chemicals.

The demand for polybutenes by 1990 is estimated conservatively at 15,000 tonnes. Against this, the production capacity of the only manufacturer in India is 5,000 tonnes. Much of the unsatisfied demand is today met by imports.

The US firm has developed and licensed over 75 plants in more than 26 countries in 20 years.

WB OFFERS AID FOR LEATHER COMPLEXES

The World Bank has shown interest in funding two projects in India for setting up sophisticated modern mechanised leather complexes. The bank is believed to have asked the Madras-based Central Leather Research Institute (CLRI) for proposals to set up two such complexes — one in the southern region and the other in the eastern region.

At a recent meeting with West Bengal chief minister Jyoti Basu, Indian Leather Technologists' Association (ILTA) president Sanjoy Sen, who is also CLRI's chairman, sought the state government's assistance in identifying land around Calcutta for the proposed complex in the eastern region. According to ILTA, Mr. Basu has assured assistance in the matter. Following identification of a suitable site for the project, a feasibility report will be prepared for submission
Bank.

According to ILTA, al
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largest exporter of leather
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BALCO MAINTAINS UPT IN OUTPUT

The Bharat Alumini
(BALCO) has maintained
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Production of 3250 to
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and 2000 tonnes of rolled
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and 91 per cent fulfilme
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Production of hydrated
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The production of hot
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The fulfilment of target
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Further details can be ha
m. G. Joglekar, NChemE
Hindustan Antibiotics Ltd. P
411 018.

PHOSPHORIC ACID CARRIERS :

SCI, CSC proposals approved

n ministry of surface trans-
proved the proposals of In-
g companies to acquire
acid carriers at an estima-
ent of about $ 135 million
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I has plans to book orders
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since the market is firming

no secret that the slow moving
y of the government has cost
an shipping industry very dear-
n fact, many ship brokers in
countries tend to add a pre-
the price whenever Indian
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the international market.
nental Shipping Corporation had
it is understood, for four new
riers in 1984. At that time, the
oted was about $ 22 million
he screening of the proposal
question-answer process went
on for a long period and finally, the company has settled for the two second-hand ships. These two ships will have the capacity to carry about 48,000 tonnes per trip.

The Indian fleet today consists only three acid carriers, one belonging to Chowgule Steamships Limited and the two to Southern Petro-Chemicals and Industries Limited. Their total capacity of carrying the liquid cargo is just about 50,000 tonnes.

India has been depending upon foreign shipping companies very heavily for the import of this liquid cargo and therefore, has been spending huge foreign exchange as freight!

In 1986-87, the country imported about one million tonnes acid cargo. In the current year, about two million tonnes are likely to be imported. According to a rough estimate, the foreign exchange outgo on freight account alone has been of the order of $ 50 million to 60 million per year. This amount would go up further in the next year as the imports of the liquid cargo are likely to go up. In the Eighth Five Year Plan, it is expected that India would import over three million tonnes acid per year. It would appear that the government has taken into consideration the urgent need to import the acid and the acquisition of ships to import it.

The transchart, the chartering wing of the ministry of surface transport has been making sincere efforts to secure adaquate share of phosphoric acid cargo for Indian ships. Most of the purchase contracts today are on a C.I.F. basis. So far, its efforts have not met with much success.

Under the circumstances the SCI and Continental Shipping Corporation which are going in for the purchase of phosphoric acid carriers would have to work out elaborate and systematic plans with the seller of the cargo to secure a good share for their ships.

REGULATIONS ON PGN PRODUCTION, SALE SOON

The Union ministry of agriculture would soon be framing a set of rules to regulate registration, manufacture and sale of plant growth nutrients (PGN) in the country, it is learnt.

The agriculture ministry had set up a high-level committee sometime ago to finalise the rules for this new industry. There are only four companies which are making these products in the country currently.

There has been a suggestion that PGN should be treated as a pesticide and, therefore, its registration, manufacture and sale should be governed by the Central Insecticides Boerd. But there has been strong opposition to this suggestion.

The manufacture and sale of PGN have been catching up in the country during the last few years as there has been a good demand for this chemical, particularly from the farmers engaged in cash crops such as sugarcane, cotton, etc. PGN has been found highly effective in cash crops, particularly with its judicious and timely use. Timely spraying of PGN on cash crops substantially reduces the maturity period of these crops.

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15 CR. HYDROGEN PEROXIDE PLANT

A group of Indian and foreign chemical experts have teamed up to set up a Rs. 15.40 crore 100 per cent export oriented unit — Asian Peroxides Ltd. — for the manufacture of hydrogen peroxide.

The plant to be located at Sulurpet in Andhra Pradesh, 80 km north-east of Madras wil make hydrogen peroxide based on auto-oxidation process, a technology closely held by four or five firms of the world.

The group of foreign experts behind the venture hailing from more than one country, are understood to have floated a company in Hong Kong for the purpose of the Indian project and will make available technology similar to the auto-oxidation process.

The annual capacity of the plant is 5,000 tonnes of concentrated hydrogen peroxide.

Initially, it was proposed to locate the plant in Kandla due to nearness to the port. But non-availability of required quantities of water resulted in shifting of the project. Since power situation in Andhra is comfortable compared to Tamil Nadu and since there is plenty of water at Sulurpet which is near Madras port, the location of the plant was shifted from Kandla

NEWS IN BRIEF

POLYMERS IMPORT TO REMAIN ON OGL

Mr. H. K. Khan, secretary, department of chemicals and petrochemicals, on July 23, assured the plastics processing industry that all polymers used as raw materials by it would continue to remain on open general licence.

At a meeting with various associations of plastics processors, he said there was no move to shift import of any polymer — HDPE, LDPE, LLDPE, PVC, polystyrene or polypropylene — to Appendix-3, the restricted list. Currently, India imports about 2.7 lakh tonnes of these items.

However, he urged the industry to identify products which could be exported to compensate for the foreign exchange loss incurred in the import of polymers. Mr. Khan is heading a delegation to short list chemicals for import as well as exports.

Furthermore, he announced that to assist the 12,000-odd small-scale plastic processors in their export effort, Indian Petrochemicals Ltd (IPCL) would set up an export division.

Regarding the distribution of imported polymers, Mr. Khan said LDPE, polystyrene and polypropylene would be made available through IPCL and NOCIL outlets around the country. However, PVC and HDPE, which are manufactured by IPCL, would be imported and distributed by the State Trading Corporation (STC), he said.

The industry, in turn, demanded that distribution of imported polymers be done through different associations.

DELICENSED LIST; PETROCHEM UNITS SORE OVER EXCLUSION

The petrochemical and pesticide industries are puzzled over their exclusion in the recently-announced list of delicensed industries.

It is only appropriate that the list should be expanded to cover MRTP/FERA companies belonging to these [illegible] sources said.

The omission of petrochemical and pesticides industries in the list goes against the Seventh Plan policy enunciation of upgrading capacities to economic size and improving the competitiveness of industries in the "thrust" areas, it is pointed out.

The need to give petrochemical industries a favourable treatment in respect of licensing and fiscal imposts as promotional measures has been emphatically repeated by several official committees, and acknowledged by the Government.

The Government, it may be noted, sought to achieve the twin objectives of liberalising licensing procedures and developing backward areas in October last, by delicensing MRTP/FERA companies in respect of identified groups of industries, subject to the locational condition of setting up the unit in any of the centrally notified backward areas.

GLYCERINE PRICE ON THE RISE

With the lockout of Hindustan Lever unit at Bombay, the price of glycerine is shooting up in the chemical market. Hindustan Lever is the leading manufacturer of this item.

Glycerine is an ideal "carrier" which ensures smooth flow and spread in a variety of applications. A drop in the eye induces a stream of tears. Heroes and heroines of the silver screen use glycerine to move themselves and their audience to tears.

Its industrial applications are in paints, toothpastes, cosmetics and pharmaceuticals. A high-value item, glycerine (HL brand, which is costlier because of its superior quality) was priced around Rs. 45 a kg before the shut-down. The price has now jumped by almost Rs. 10 to Rs. 15 in some [illegible]

HL has almost 60 per cent of the market. Other leading manufacturers include Godrej and Tata Oil Mills Co (Tomco). The price of Godrej brand has now gone up by Rs. three per kg [illegible] the shutdown.

Pharmaceutical units u
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Glycerine manufacturing
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GALLIUM PLANT WORKI SUCCESSFULLY

Indian scientists are
operating a pilot plant fo
tion of high purity galliu
material for electronics a

The pilot plant is a j
the National Research and
Corporation (NRDC), the
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Council of Scientific and
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the department of atomic
the Madras Aluminium Co
chief engineer T. Narayan

Briefing newsmen abou
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88, Mr. Narayanaswamy
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Mr. Narayanaswamy sa
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These would meet the
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swamy said.

Plastic crates for food packaging

[illegible] scheme to use a big way in agriculture packaging will be launch-

eme has been prepared ty basis owing to the ur- d to conserve depleting for- [illegible]

studies have indicated et cover in the country is at an alarming rate. And he main reasons for large- ing of trees is for packa- poses. Unless steps are tak- place wood-based packaging ics, it is felt it will not be to reverse this trend. [illegible] of plastics in agri- [illegible] lead to tremendous sav- [illegible] water resources.

ublic sector Indian Petro- Limited, according to offi- ces, will provide technical for the programme both oducing plasticulture in rural nd also to promote use of in packaging.

promotional measure, IPCL n asked to provide 20,000 crates to the Jammu and r government for transport s and vegetables. In addition, [illegible] will provide technical ow for setting up units to cture plastic crates in this

ministries of industry and ure which are collaborating programme have also decided e IPCL expertise in the plan to promote use of plastics in rural areas. About 12 districts with varied climates have been identified for launching the plasticulture programme initially.

The focus of the plasticulture promotion scheme will be on use of LDPE film lining to conserve water, drip irrigation, nursery bags made out of LDPE film, greenhouses and post-harvest handling of foodgrains.

Other areas which will be propagated at the district level are use of plastic pipes for agriculture pumpsets, plastic tubewell castings, plastic water distribution network for tubewells, sprinkler irrigation and land drainage.

Official sources point out that the other plank of the programme, use of plastics in food packaging, will entail involvement of the concerned state governments, IPCL, fruit marketing agencies and plastics corrugated board manufacturers.

It is proposed to evolve standardised size and design of plastic crates for use all over the country. As it felt that development of a national grid would help rotation of the crates and reduce empty transportation. Over a period of time, the committee pointed out, this would render these crates economically more viable compared to conventional wooden crates.

HDPE/LDPE MANUFACTURE UB PROPOSAL REJECTED

The United Breweries group has received a setback with government turning down its proposal for the manufacture of high density polyethylene/linear low density polyethylene in Andhra Pradesh.

The project, mooted by the Phipson and Company Limited, one of the units of the UB group, involved an outlay of Rs. 22,000 lakhs and the plant was to be set up in Visakhapatnam. The capacity proposed was 1,35,000 tpa of HDPE/LDPE and the project finance was to be met thus: equity Rs. 7,438.12 lakhs: preference capital convertible: Rs. 12,396.88 lakhs: debentures-NCD Rs. 100 lakhs: supplies credit for exchange Rs. 2,000 lakhs and internal accruals Rs. 65 lakhs.

The proposal was rejected on the ground that the company was basing its project on ethylene to be obtained from Naptha cracker at Vizag and its availability was not assured. Earlier, the government had also turned down a Birla's proposal for a HDPE project in Vizag setting up downstream units since the Centre had not yet taken any decision on the cracker unit. The project cost was Rs. 12,500 lakhs and capacity proposed one lakh TPA.

Meanwhile, the government in a recent order cleared the Reliance Industries' revised project cost scheme of finance for the LAB project planned at Patalganga with a huge capacity.

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Polymer imports will benefit all

The recent Government announcement that it will allow import of polyethylene, polystyrene and PVC has been received with mixed reactions in the market.

While on one hand it vindicated the statement reportedly made by one of the directors of Reliance Industries Ltd. (that its petrochemical unit would be allowed to import 200,000 tonnes of HDPE/PVC), it also took the wind out of Reliance's sails as the Government had decided to allow import of these items not only to Reliance management, but also to almost everybody either for actual use or for stock and sale.

While the Reliance management neither confirmed nor denied the statement reportedly made from its side, little was done to dispel reports that Reliance Petrochemicals Ltd. (RPL) would be the beneficiary of enormous trading profit which could then be distributed to RPL's shareholders right from the first year itself (i.e. two/three years prior to commencement of actual manufacturing activity).

These favourable reports persisted till Mr. H.K. Khan, Secretary, Department of Chemicals and Petrochemicals, made a public statement that Reliance would not be allowed to import HDPE/PVC as the same were on open general licence, but for actual users only. Within a week since then, the Government has effectively refuted Mr. Khan's statement. But it has also ensured that RPL will not be allowed any special concession for import of these commodity plastics.

According to reliable reports, the Government's recent announcement that import of such plastics would be allowed for actual use and for stock and sale purposes was a result of twin pressures. While on the one hand there were reported to be pressures from the Reliance camp for allowing import and sale of HDPE/PVC prior to manufacture of the same by the company, there were similar pressures from the Hindujas too. These reports point out that the Government clearance for Finolex's PVC project (which is alleged to be actually a Hinduja project) was to be based on import of VCM (vinyl chloride monomer). Since both groups wanted to import these items, add these sources, the Government finally consented to allow such imports by anyone who desired to.

Whether these reports are true or not, almost everyone agrees that in the perspective of what the country needed at present, the new policy couldn't be better. For one, explains one manufacturer of plastics in India, it allows for large volume import of such items which in turn should allow the Indian buyers to wrest a better price than small volume importers of such items could ever do. Two, it does not restrict the nature or scope of imports to any one or two preferred buyers. This, he adds, would go a long way in removing the popular view that the Government had been constantly giving in to pressure groups and consequently favouring one group or the other.

Charges that it would inflate India's import bill are baseless, add informed sources. In any case such imports have been taking place, though by actual users. Last year around 70,000 tonnes of PVC and around 75,000 tonnes of HDPE were imported. By 1992 the demand and supply gap for PVC and HDPE are estimated to soar to around 115,000 tonnes and 141,000 tonnes respectively. Even these would have to be met out of imports.

What is likely to happen is that large imports of HDPE/PVC will now take place, say market sources. These large-scale importers are most likely to include the Reliance management, the Hindujas and the Mafatlals.

Reliance will need to resort to both HDPE and PVC if it has to earn trading profits and establish a marketing network for its products before its manufacturing activities begin. Reports indicate that it has already tied up with overseas suppliers of such plastics to the extent of around 40,000 tonnes.

So will the Hindujas. This is because, if they are truly behind the Finolex project, they too will need to establish marketing networks before their [illegible] tonne num PVC plant goes on s Jalgadh in Maharashtra shouldn't be too difficult Hindujas, since they alrea acquired the trading righ Gulf Oil Trading Company for most parts of the wor are also reported to be ma ers in petrochemical prod world over.

Even the Mafatlals will import PVC (which Nocil p and HDPE (of which PIL is producer at present in Ind and PIL both have plans fo sion which are awaiting c from the Government. O they too would like to see t isting marketing networks n prior to their being allowe hance their production c Moreover, as they have the seas collaborators (notably who are also major prod such plastics, they too shou rience little difficulty in PVC and HDPE at bargain

This obviously means th margins for such plastics are likely to be marginal, user of such plastics in Bom The good thing is that small such items are likely to get HDPE easily. This would g way in helping them redu inventory levels. This in tur mean better use of the mo have with them, he adds.

However, if the Governme industry to grow in a heal ner, it will have to ration import duties for such plast ly to be imported, and exci for items that are already be nufactured. Such reduction ties would result in plastics ing more affordable, which would allow the market to significantly, adds an IPCL

"The Government has tak jor decision in favour of plastics in India", adds a ma ducer of such items. "To s way wouldn't be fair. At the growth of the industry future of plastic produc which are in the process o up large capacities for t such items".

Input shortage hits paint industry

eral shortage and exorbie of raw materials are sendering the growth of the aint industry. Addressing conference at Calcutta on Mr T.P Kohli, eastern rerman, Indian Paint As- (IPA) said for the first ustry has witnessed negawth due to these adverse During the period April February 1988, industry rea negative growth of 7.2 t.

ng out that this was against eral growth in the national , Mr Kohli said the govmust take effective steps fy this anomaly, especially e industry plays a vital preserving national assets. on loses more than Rs. two worth of assets annually bef corrosion.

ng to raw materials availhe said it was surprising hile India has an abudance um-rich ilmenite sand, s the raw material for protitanium dioxide rutile, a shortage of the product country. Titanium dioxide the major pigment used by its. In fact, it has only the last three years, with mmissioning of the Kerala and Metals Limited (KMit, that titanium dioxide rubeing made indigenously.

er, Mr. Kohli said that sinctual production of KMML is far below the installed capacity, industry is still forced to import the material. Besides, he said, the price factor is increasingly becoming a major concern with KMML revising its price upwards six times within the last three years. The last revision, which takes effect this month, had made the KMML product more expensive than the international price. While the international price of titanium dioxide rutile is around $ 2,400 per tonne, the KMML product works out to $ 4,290 per tonne, he added.

Mr. Kohli pointed out that at present the Centre had taken various steps to give a fillip to industry, including delicensing the manufacture of titanium dioxide rutile, removing the export obligation for titanium dioxide import, decanalising import and reducing the basic import duty from 60 per cent to 40 per cent. Welcoming these changes, Mr. Kohli said unfortunately industry could not realise any benefit due to escalating costs and non-availability of the raw materials.

In this regard, he urged the Union government to persuade KMML, which is a public sector undertaking, to reduce the price.

BOMBAY DYEING MAY STOP DMT PRODUCTION

A raw materials crisis looms large over the polyester industry as Bombay Dyeing, the largest DMT producer in the country, has threatened to stop DMT production unless the government reduces customs duty on paraxylene, according to Mr. P.C. Rustagi, the president of the Association of Polyester Staple Fibre Manufacturers.

He said this while discussing the passing on of tax concessions by polyester industry at the price monitoring committee meeting in Bombay on July 29.

It is understood that Bombay Dyeing had been persistently asking for a reduction in customs duty on paraxylene in view of the steep hike in paraxylene prices abroad.

Earlier, the company had asked for an increase of Rs. 2.50 per kg in DMT price to compensate for the increased paraxylene cost. The government had not accepted the plea and had decided to review the situation at a later date.

Bombay Dyeing has an annual capacity to produce 60,000 tonnes of DMT. It has supplied 59,355 tonnes of DMT valued at Rs. 124.65 crores to the consuming industry during 1987-88 against Rs. 48,166 tonnes worth Rs. 101.15 crores in the previous year.

The government had increased import duty on paraxylene from 85 per cent to 120 per cent immediately after the budget.

"The representation made by the company for reduction in the import duty consequent upon the steep increase in the international price of paraxylene, is under consideration of the government", according to Mr. Nusli Wadia, chairman of the company, in the recently released annual report of the company.

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Protein folding intrigues scientists

Unfolded, a protein is a useless, floppy chain of amino acids. Folded up, it becomes a functioning engine, ready to process, chemicals, send signals, attack invaders, metabolise energy, bind wounds or otherwise contribute to the business of eating, breathing and thinking.

The folding of proteins into their working three-dimensional shapes — the final step in the manufacture of life's essential building blocks — is emerging as unexpectedly troublesome problem for molecular biologists. Scores of research teams are struggling with the intricacies of connecting the information stored in sequences of amino acids to the particular spikes, grooves and rods that make a given protein work.

The folding problem, part chemical and part mathematical, has taken on a special urgency with the recent development of biotechnology, particularly as companies try to achieve the mass production of commercially valuable proteins, such as human insulin. The next step, designing new proteins that are not found in nature, will require an understanding not just of protein genetics and protein chemistry, but also of how proteins fold.

In the instant after a new protein is created in a cell — an instant that can last from a fraction of a second to several minutes — this long one-dimensional string has to bend and coil into its three-dimensional form. Its arrangement of cables, slots or pincers determines the protein's function in the body's chemistry.

The original sequence of basic amino acid units somehow determines how the protein folds. Each protein seems to have a unique final form. The rules of that process, the links between certain groups of amino acids and certain final shapes, are just beginning to be uncovered.

Without an understanding of the process that bridges this gap, geneticists have no way of looking at a new sequence of amino acids and guessing the shape and purpose of the protein it represents. That sort of knowledge will be essential as scientists continue to assemble a catalogue of all the genetic information in human DNA, the blueprints for creating particular proteins, or amino acid sequences. Only by understanding how a newly discovered amino acid sequence might fold, will geneticists be able to predict its biological function.

Proteins can unfold again when heated or subjected to some chemicals, generally with catastrophic results. Cooking an egg unfolds its proteins into long strings, with the result that they interwine in a tangled network that hardens and scatters light, changing colour. Under less drastic conditions, laboratory researchers have occasionally been able to get unfolded proteins to fold back properly.

Biotechnology laboratories have repeatedly encountered their own version of the protein folding problem. After successfully getting bacteria, for example, to make large quantities of valuable proteins ordinarily made by cells in the body, they have sometimes found teins turning into useless lumps, because the chemi ronment somehow prevents folding.

Scientists now believe th have seriously underestima intricacy of the machinery to protein folding. Researche the last generation have ofte the process for granted, a that a protein string simply and coils until it has colla a stable final shape.

DULEEP SINGH RETIRES F RCF

Mr. Duleep Singh has relin charge as Chairman and M Director, Rashtriya Chem Fertilisers Ltd., on July 31.

He has guided the comp more than two decades brought in a number of in changes in the management which proved to be a tre for the Fertiliser Industry o

Mr. R. Venkatesan, Direc nance), RCF, took over char Mr. Duleep Singh, accordi RCF press release.

Mr. Singh's greatest con to the organisation was the up of Asia's largest ferti ject at Thal on schedule ar out any cost overrun. made social welfare an development a religion, and cern for environmental p is now a legend.

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Fertiliser import to cost Rs. 635 crores

About 5.01 million tonnes of fertilisers is expected to be imported during the current year entailing a foreign exchange outgo of as much as Rs. 635 crores.

This would be higher by Rs. 150 crores from the 1987-88 level of Rs. 485.31 crores.

The steep rise in imports is because of a spurt in prices in the international market and the increased quantity that is slated to be purchased from overseas.

Already, during the first three-and-a-half months of the current year, i.e., from April 1 to July 15, about 1.37 million tonnes of fertilisers valued at Rs. 190 crores have been imported against 0.99 million tonnes valued at Rs. 117.02 crores imported during the corresponding period of last year.

This means that this year, one tonne costs about Rs. 1,386.71 whereas last year, the cost was around Rs. 1,177.26 thereby showing that the international price has gone up by as much as 15 per cent.

Of the 5.01 million tonnes expected imports, finished fertilisers would account for 1.81 million tonnes valued at Rs. 249.21 crores and raw fertilisers are likely to be around 3.2 million tonnes worth Rs. 385 crores.

Interestingly, during April 1-July 15, 1988, 57.297 tonnes of urea has been imported costing about Rs. 13.35 crores for which there is no provision provided for in the 1988-89 fertiliser budget. However, during the same period last year, urea imports were of the order of 68,796 tonnes valued at Rs. 9.59 crores.

The total purchases of finished fertilisers during the period so far have been at 0.33 million tonnes valued at Rs. 52 crores against 0.21 million tonnes valued at Rs. 21.90 crores imported during the corresponding period of last year.

In the raw fertilisers group, purchases so far have been effected for slightly more than one million tonnes costing Rs. 139.05 crores against 0.77 million tonnes valued at Rs. 95.12 crores last year.

A close look at the figures shows that the prices for finished fertilisers in the international market have gone up by as much as 33.77 per cent whereas, prices for raw fertilisers have registered an increase of 11 per cent.

In the case of urea, there has been a rise of 40 per cent over the previous year and when compared to 1986-87, the prices have almost doubled.

In July 1986, India made its last urea purchase of about two lakh tonnes from the USSR at $65 per tonne. The current price is, however, put at $125 per tonne. Last year, it was $85.

Experts point out that as a result of a few large fertiliser projects running into cold storage and the underutilisation of capacities of the existing plants, urea production is not expected to hit the target.

In the case of nutrients, the quantity imported is also expected to go up. It is understood that the Minerals and Metals Trading Corporation (MMTC) has been asked to contract for import of 1.20 million tonnes. Last year, 0.98 million tonne was imported valued at Rs crores.

Experts feel that the increa the quantum of imports have necessitated to meet the food target of 166 million tonnes 1988-89 and for 715 million by the end of the Seventh P

Also, with the arrival of monsoon, the consumption of lisers is also expected to go u

RELEASE OF IMPORTED FERTILISERS TO BE HELD

The Union minister of state feritliser, Mr. R. Prabhu, sai lease of imported fertilisers be held back until all the ind usly produced fertilisers were ared for consumption.

Speaking to newsman in Co tore he said with the beginn the khariff season, the fertilise take was picking up. Agains target of 103 lakh tonnes of ents, he expected an off-take out 95 lakh tonnes for distri during the year.

Referring to the fertiliser minister said that except for the stocks of all other fertiliser been cleared. In view of good prospects and early monsoon year, even the existing urea would be consumed, he added.

Mr. Prabhu said the govern proposed to rationalise the of transport subsidy on fer and it was trying to reduce subsidy.

Mr. Prabhu said the gover had asked the experts to pr a detailed project report for habilitation of the Fertilisers Chemicals Travancore Limited CT) unit in Kerala.

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PUR FERTILISER PLANT

Topsoe submits revamp report

r Topsoe, Danish subsidiary u Progetti of Italy, has sub- its recommendations about ing of the 15-year old Dur- fertiliser plant of the Hin- Fertiliser Corporation (HFC) would cost the Government Rs. 175 crores.

rding to the Danish com- the revamping of the Durga- rtiliser plant will have to be ented in three phases: (1) ation of production at 80 per ated capacity, (2) stabilisa- f production at 100 per cent capacity and (3) stabilisation duction at 110 per cent rated ty.

three lakh-tonne capacity projet was set up in te- l collaboration with Monte now known as Technimont ly, in 1973. To carry on pro- n at a respectable level, the authorities took up a Rs. 8-cr. ing programme. Of this, so ound Rs. 2 crores has been spent. With another Rs. 3 crore investment, the authorities expect to raise the production this year to around 2.1 lakh tonnes of urea, compared with last year's 1.26 lakh tonnes per annum. The accumulated loss of the plant stood at Rs. 256 crores at the end of 1987-88.

It is estimated that the first phase of the proposed revamping would cost around Rs. 60.5 crores and would take about one and a half months to complete. The second-phase revamping, which is expected to be completed within two months, would entail fresh investment of Rs. 8.6 crores. The third phase would cost about Rs. 25.3 crores and would take two months to execute. Thus, the total fund requirement would be of the order of about Rs. 174.5 crores.

Under the first phase, the revamping plan for ammonia and urea would be taken up. In the ammonia plant, the renovation of primary reformer roof and modification of burners and roffin boxes would be taken up besides minor modifications of secondary reformer. In the purification section liquid distribution and redistribution system would be renovated.

Other jobs to be taken up include: (1) replacement of mechanical seals of semi-lean solution pump, (2) replacement of reboiler, (3) change over from vetrocoke process to glycine process, thereby eliminating use of arsenic compound (4) installation of some more coolers/blowers etc. for adoption of the changed process.

In phase two, the primary reformer and waste heat recovery in the ammonia plant would be totally replaced. Secondary reformer would be relocated and renovated. Catalysts, reform gas boiler, and the purification section's boiler feed water heater would have to be replaced. The process condensate stripping system would be installed and the same would be reused as boiler feed water.

In the third phase, the synthesis gas compressor and process air compressor have to be replaced.

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Fertiliser use up despite drought

Despite the terrible drought, fertilisers consumption rose to 90.72 lakh tonnes in 1987-88 from 83.39 lakh tonnes in 1986-87, according to official figures of the Department of Fertilisers.

Fertiliser production also marginally rose to 54.66 lakh tonnes of nitrogen and 16.63 lakh tonnes of phosphate during the year from 54.10 lakh tonnes and 16.60 lakh tonnes in the previous year.

The total production and consumption were, however, much below the target of 56 lakh tonnes of nitrogen and 21 lakh tonnes of phosphate and 108 lakh tonnes of total fertilisers.

For the current year, the production target has been set at 64 lakh tonnes of nitrogen and 22 lakh tonnes of phosphate, the figures showed.

The overall average capacity utilisation of the industry as a whole, however, fell from 79.1 per cent nitrogen and 90.1 per cent phosphate in 1986-87 to 77.6 per cent and 71.5 per cent respectively during 1987-88.

The country would have built up a total installed capacity for producing 81.46 lakh tonnes of nitrogenous fertilisers and 26.50 lakh tonnes of phosphatic fertilisers annually by the end of March next year.

Department sources said that import of fertilisers is necessary because there are no known indigenous sources of potassic fertilisers and the production of nitrogenous and phosphatic fertilisers is not adequate. But the import quantities are reduced gradually as the indigenous industry had made remarkable improvement in its working.

Fertilisers consumption in the country declined from 87.37 lakh tonnes in 1985-86 to 83.38 lakh tonnes in 1986-87 and rose to an estimated 90.72 lakh tonnes in 1987-88.

The country had a total stock of 35 lakh tonnes of fertilisers as on April 1 this year, which is slightly lower than 37 lakh tonnes on the corresponding day the previous year.

This is said to be higher than the normal 15 lakh tonnes which is needed and absorbed mainly in stocking fertilisers in a logistically advantageous way to meet the demand of all regions alike including the high-consuming and the low-consuming areas, they said.

Most of the fertilisers upto 70 per cent are consumed in the country's irrigated areas which constituted 30 per cent of the total cropped area. Farmers do not take the risk of us-

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The government sub
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This is said to be as
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The government, the
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l accord on patent protection urged

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The U.S. argument is that research and development for new industrial products and processes require large investments which will not be undertaken by companies unless financial reward is ensured.

The U.S. administration, which is very serious about an international accord on the issue, recently imposed trade sanctions against Brazil by launching an investigation into exports by Brazil worth 200 million into the U.S. market alleging that they infringed the U.S. patent rights.

The main elements of the U.S. proposal for a new international code say that patent protection should be available for all types of inventions in all areas of technology, including foodstuffs, pharmaceuticals and pesticides, and that the patent term should be at least 20 years.

Trademarks should be registered for no less than ten years while the minimum term of copyright protection should be for the life of the author plus 50 years.

Semi-conductor chip lay-out and design should be protected for at least ten years from the date of first commercial exploitation.

To enforce this code, the United States has proposed stronger measures at the international borders to stop trade in goods that infringe on intellectual property rights, besides a mechanism within GATT to settle disputes.

TAN INDIA TO MAKE SORBITOL

The private sector company — Tan India Ltd. — the country's lone producer of vegetable tanning agent made from wattle extract — is launching a new project to manufacture Sorbitol, an industrial sweetener from tapioca starch.

Chairman and managing director of the Tan-India group of companies S.S.M. Subramaniam told newsmen on Saturday that the Rs. [illegible]-crore project, to be located at Kathari near Sankari in Tamil Nadu's Salem district, would go on stream by January [illegible] and the commercial production of Sorbitol would commence from February next.

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canalisation upsets aluminium users

vernment decision to de- ports of aluminium, in- ds, has sent a wave of ng user industries. They n taken aback by this ecision, even though they easy availability of alu-

The import of aluminium lised through the Minerals ls Trading Corporation but with decanalisation n be effected under OGL l users, export houses as rading houses.

MTC was importing alu- and aluminium rods for the years to bridge the de- d supply gap. However, eems to have been decana- view of rising prices in the arket and the consequent ng suffered by the MMTC. industries are not happy government decision to de- imports because of the high prices prevailing in the inter- market at present. The land- of the metal works out to 40,000 per tonne, inclusive ies, and it will therefore be ficult to effect imports. The retention price of alumini- ks out to about Rs. 29,000 per In the event of import, the will have to subsidise the eavily in view of wide gap the internal and interna- rices.

ding to Mr. Navin H. Shah, t, All-India Non-Ferrous Industries Association, the isation is untimely and may lp the user industries. User ies do want the easy avail- f metal but they want to their requirements at stable sonable prices. The need our is to bring down the of aluminium through suitable es. The excise duty on alu- still continues to be on an ad n basis. Repeated pleas o change the mode of ex- y duty to a specific basis, on weight without incurring s of revenue, have not found with the authorities. The budget for 1988-89 reduced cise duty on aluminium and window frames from 20 r to 15 per cent and on foils from 25 per cent to 15 per cent ad valorem.

The government should have reduced excise duty on all semi-fabricated aluminium products to 11 per cent which is the duty levied at the ingot stage in order to have a healthy and balanced growth of different uses of aluminium.

The shortage of aluminium presently experienced by users is mainly on account of the teething problems experienced by NALCO, a government of India undertaking, in achieving a production level as per its rated capacity. Till NALCO does not reach its rated capacity of 2.18 lakh tonnes per annum and is not in a position to assure a minimum supply of 15,000 tonnes per month, the import of aluminium has to be resorted to bridge the gap between demand and supply.

About 40,000 tonnes of aluminium is expected to be imported during the current financial year, taking into consideration NALCO's present level of production of only 5,000 tonnes per month. The long-term objective however, would be to make the country self-sufficient in aluminium as early as possible. Further, with the international price ruling substantially higher than indigenous prices, it would be easier for the country to export value-added products made of aluminium.

ASSAM TO PITCH FOR PETROCHEM COMPLES

The Assam Government will urge the Centre to set up a petrochemical complex at Barak Valley of the State in view of the exploration of vast reserves of natural gas and oil in the valley.

The Chief Minister, Mr. Prafulla Kumar Mahanta, conveyed this to a delegation of the Barak Uptyaka Sangram Sammanaya Committee during a discussion in Guwahati

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More gas-based power plants to be set up

The Union government is considering the possibility of putting up at least 3000 mw of gas-based power projects during the eighth Plan. Exercises to identify the sites for this purpose, it is learnt, have already begun.

According to information available in New Delhi, the National Thermal Power Corporation (NTPC) alone is expected to put up at least one gas-based power plant each in Gujarat, Tripura and Andhra Pradesh. This would be in addition to the four already being put up by NTPC at Kawas (Gujarat), Auraiya (UP), Anta (Rajasthan) and Dadri (UP).

The NTPC has already begun discussions with the Oil and Natural Gas Commission (ONGC) to work out the possibility of utilising the gas potential in Gujarat, Tripura and Andhra Pradesh.

Sources in New Delhi explain that all the three plants that are expected to come up in Tripura, Andhra Pradesh and Gujarat, will be of over 500 mw each.

In view of the huge availability of gas, the NTPC has also decided to double the envisaged capacity of its gas-based power plants at Dadri and Anta.

While the capacity of the Dadri plant is being doubled to 1300 mw, that of the Anta unit is being increased from 420 mw to 880 mw. The NTPC is, at the same time, examining the possibility of putting up a 500 mw gas-based power unit at Faridabad.

Apart from these units, it is learnt that the Union government is examining the possibility of utilising the available gas along the HBJ pipeline in a bigger way. It is awaiting a firm commitment from the Gas Authority of India (Gail) as to how much gas can be assured for power plants. Should these points be clarified, there are bright prospects of gas-based power plants coming up at Punjab also. In addition the southern region could be given more gas plants if the ONGC decides to provide an assured supply.

Sources in New Del
both Tripura and th
Assam and Cauvery
to be extremely rich
Krishna-Godavari are
has already built up a
line for feeding some
units. Even though, th
state, the units have n
ed themselves for the
The prospects of ga
based power plants in t
brightened in view of
these plants will be a
available quantum. It
oned that the Krishna-
in alone will be able
million cubic metres o
In Tripura also, sou
Delhi explain, there is
for setting up gas-
plants. In fact, the
electricity departmen
utilising the gas suppl
The current rate of
Tripura electricity dep
the Baramura struct
1.8 lakh cubic metres
Meanwhile, the Un
ment is examining
from different states f
gas-based power plant
capacity of these pro
3000 mw. The propos
submitted by Assam,
desh, Gujarat, Haryana
Pradesh to the Centra
Authority (CEA).

NICKEL, TIN PRICES

The inter-ministerial
the Government has rai
of tin and nickel by R
tonne.
The tin price has be
Rs. 2,20,000 per tonn
2,30,000. Nickel briquet
el squares prices have g
4,35,000 from Rs. 4,25,0
pellets/F shots/strips p
up to Rs. 4,37,000 from
Prices of other non-f
remain unchanged. Th
would be effective fro
until further notice.
The prices of non-f
which have remained u
as follows: electrolytic
bar/high-grade cathode
continuous cast copp
Rs. 44,000, electrolytic
zinc Rs. 46,000, special
zinc, Rs. 46,500, pig
rently Rs. 33,000 and

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S FOR GAS — BASED POWER PLANTS

Industry wary of AP proposal

hra Pradesh government's nnouncement of its inten- [illegible] the resources of the thermal power stations West Godavari district ving the private sector in [illegible] of "consumers" has [illegible] any enthusiasm in circles in the state.

the government is yet to the modalities of what has [illegible] in the budget state- "a pioneering effort at in- neficiaries in the genera- ower", the private sector is wary about the offer of pted power supply to in- which deposit Rs 15 cro- the state. For one thing, eems to know exactly what chief minister, Mr. N.T. had in mind when he offer at the annual func- the Federation of Andhra Chambers of Commerce stry in Hyderabad recently by available evidence, e state electricity board is mplete a formulation of the nnounced by the chief mi- The APSEB had convened a ry meeting of industrialists ary last to chalk out a plan but was unable to pin the atives of industry to any ent as they were not con- bout the viability of the sed scheme.

the private sector in the that the APSEB will not to ensure an uninterrupted of power to those industries financially in the scheme the beneficiaries will in- clude industries without in the project. Further, in- sources say, the Central Elec- Act restricts the production ibution of power on the private participation and such, the state government's is likely to get enmeshed in of legal and [illegible]

In any event, the proposed of Rs. 1.5 crores may prove o much for some industries— [illegible] when the benefits are ed

[illegible] to [illegible] the proposed [illegible] which the APSEB grants permission for the installation of diesel generators capable of meeting 40 per cent of a unit's power requirement.

Meanwhile the Federation of Andhra Pradesh Chambers of Commerce and Industry has come out against the offer on the grounds that the government's offer of an uninterrupted power supply to donor industries amounts to discrimination against those industries which are unable to participate in the proposed scheme.

The negative reaction from the private sector notwithstanding, the APSEB is intent upon going ahead with the establishment of three gas-based thermal power stations in West Godavari district — with or without private participation — in the next six months.

N. ATLANTIC OIL RIG FIRE EXTINGUISHED COMPLETELY

Oil trouble-shooter Red Adair has extinguished the last well fire on the Piper Alpha oil rig, which blew up three weeks ago and killed 167 men.

A spokeswoman for Occidental Petroleum, which owns the rig, said Adair poured concrete down the last of the wells on the platform, 190 km off the Scottish coast in the north Atlantic.

"There is much work to be done yet", she said.

The Piper Alpha exploded in a fireball on July 6 night in the world's worst oil rig disaster.

Sixtyfour men escaped and were saved from the sea, but one later died of his injuries. Most of the bodies have not been recovered.

Adair was called in from Texas to extinguish fires in many of the rig's 36 well heads and he and his team have been working steadily since, in often poor weather conditions, inserting cement plugs into all the wells after pumping sea water into them.

The explosion is expected to cost insurers more than $ 1 billion in claims, which would be a record, Lloyd's of London insurance market has said.

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ONGC's integrated energy plan : study of pricing suggested

The need for a detailed study of the energy pricing policy, working out the quantum of investment in different energy sectors, decentralisation of energy management and greater use of gas by different sectors, are among the major points made in the integrated energy plan prepared by the Oil and Natural Gas Commission (ONGC).

ONGC has suggested that as margin between the prevailing prices and the cost of production of commercial energy sources (like coal, gas and power) are rather narrow, a detailed study of the energy pricing policy too should be undertaken. The idea is to enable these sectors to generate adequate internal resources.

The integrated energy plan further points out that as the noncommercial energy sources constitute the main resource base of rual India, it is imperative to develop suitable institutional arrangements at the village level for managing the community bio-gas plants and other non commercial energy systems.

In fact, it suggests that a proportion of the proposed energy cess and a percentage of the funds available for various rural poverty eradication schemes, could be allocated for the development of energy system in rural areas.

Likewise, it suggested that there should be greater use of gas in different sectors with a view to reducing the dependence on imported crude oil. These objectives, though readily acceptable, need large inputs in terms of infrastructural facilities for optimum use.

The plan also underlines the need for forming an apex body for monitoring the management of different energy sectors. This would be necessary for laying down suitable norms of energy efficiency in different sectors, monitoring the implementation of various recommendations on energy conservation in different utility sectors, funding and monitoring R and D efforts in inter-fuel substitution, and managing the energy cess for funding the planned R and D efforts on technology, for reducing energy intensity coupled with inter-fuel substitution

The integrated plan has been framed with the primary objective of reducing the total energy related foreign exchange burden. The plan covers the time period 1990-200 A. D. and has studied the long term availability vs the demand of commercial energy alongwith non-commercial energy. An optimal energy mix, worked out at the national and regional level, under the integrated plan, notes that the import of oil can be brought down substantially through economic efficiency in the short term and resources availability, conservation and inter-fuel substitution in the long term. It stresses the necessity of shifting attention to the use of natural gas as a substitute for oil.

The optimal energy mix for the various sectors of energy regionwise, has been worked out on the basis of demand, resources, interregional transportation, interfuel substitution, conservation, technology and the cost and price for different energy sources. A preliminary study of the conservation potential in industry, agriculture, transport, household and power sector, has been under-taken for the formulation of the optimal energy mix.

The integrated plan emphasises increased involvement of natural gas as a source of energy, particularly in the sectors where it can effectively be used as a substitute for oil. It is noted that natural gas is an effective replacement for naphtha in the fertiliser sector; furnace oil in the power sector; kerosene and LPG in the domestic sector and diesel and furnace oil in the industrial fuel sector. As it is, considerable progress has been achieved in substituting natural gas for middle distillates in the transportation sector which accounts for the bulk (56 per cent) of the total consumption of petroleum products.

The plan notes that the primary thrust of a national energy strategy should be to reduce the total energy related foreign exchange burden. In general the energy planning process needs to be studied and analysed on three fronts. First there is a need to establish links betw the energy sector and the rest of economy. Secondly, it is neces to analyse the interaction betw the different sub-sectors. Thi there is the need to examine n closely the activities within each dividual sub-sector.

Similarly, it is pointed out that share of investment in the en sector has been increasing every plan. Besides the multi effect in the economy, it is imp tive for the investments in this tor to "justify themselves" and tain themselves" and sustain th selves through an "adequate ra return." According to the plan, profit margin in the case of coal and power are too narro generate adequate internal reso for making these sectors self-g rating.

For this the energy plan has commended a detailed study of energy pricing policy as also quantum of investment in diffe energy sectors.

SITE SELECTION ON FOR ATOMIC PLANT

Site section for a 1,000 mw a power plant in Bihar is unde official sources said.

A six-member team of the A Energy Commission had visited runa in Singhbhum district and ramchatti in Rohtas district to dy the feasibility of setting u proposed power plant.

The committee was yet to fi the site, the sources said.

They said the committee had ed for information on land ac tion, hydrology and seismolog the State Government followir visit.

The Government has assigne task of seismological studie Arya, Head of the Department mology), Roorkee University

G COSTS IN POWER SECTOR

Coal may lose primacy to LNG

rimacy of coal in the coun- ergy policy may undergo a The new energy policy being discussed seriously, at est level in the government replace coal by liquified na- (LNG) in the power sector uce costs.

follows detailed studies on ergy scenario suggesting that esent policy has led to a hig- ost for the national economy. y being the basic input has af- a number of vital sectors sely. The studies show that has turned out to be the "wea- link" in the vertically integra- national economy and that the has come to get rid of this syn- e.

e studies touched on various natives such as using domesti- produced coal, imported coal fuel oil and natural gas for pow- neration. It shows that the cost ower generation using fuel oil 16 FoB) at a location 1,250 km from the port is less than that coal-based plant located at the ad. This suggests that almost power generation will have to be d on liquified natural gas. In r worlds, the economic size of the ket for domestic-coal is almost As the location gets closer to the relative advantage would even higher.

e proposed NEP envisages much r use of natural gas either do- ic or imported in the LNG form. orts of LNG can be arranged on -term basis with contract period 0 to 15 years. The NEP also en- ges an all-India gas distribution astructure which will enable the nomy to expedite exploitation of a's own natural gas reserves ch today stand as high as that of e oil.

e cost of coal and the conse- t energy costs for the consum- on the other hand have increas- six-fold between 1970 and 1971 1985-86. The cost for the aver- consumer of "E" grade coal has eased from 2.06 paise per 1000 kcal 979-80 to 6.20 paise in 1985-86.

he high grade "A" non-coking sold at Rs. 137.50 a tonne free road (FoR) in 1980 is priced at 296 a tonne in 1987 — an incre- of 115 per cent — over a per- of seven years. The average 'D' grade price rose from Rs. 92.50 a tonne in 1970 and Rs. 209 a tonne in 1987 — an increase of 126 per cent.

Production of coal increased from 73 million tonnes in 1970-71 to 166 million in 1986-87. The sudden jump in production is mainly accelerated by the two oil shocks. Unfortunately, the additional volume of output has been the outcome of crash investment of large magnitude in the new open cast mines rather than a more efficient use of the existing mines. The ratio of underground and open cast mines is reversed from 73 to 27 and to 40 and 60. It is liktly to go down still further.

There are other negative factors: the high ash content (as much as 45 per cent) and low coking properties characterise the prime coking coal supplied to steel plants.

While the price of coal has nearly doubled between 1980-86 in India, world prices of coal which peaked in 1981 between $62 and $65 gradually declined touching $45 and $47 in 1985.

The study by the Bureau of Industrial Costs and Prices (BICP) shows that capital employed in coal mining sector has increased significantly over time. As against Rs. 515 crores in 1975-76, it reached Rs. 4,055 crores by 1985-86. Gross profit to capital employed has been negative in most of the years. The capital-labour ratio in current prices shows a sharp escalation in capital employed per worker from Rs. 8,702 in 1975 to Rs. 61,268 per worker.

Also, fixed capital employed per tonne of output has risen from Rs. 130 a tonne in 1980-81 to Rs. 320 in 1984-85. Net fixed capital per tonne of coal output rose from Rs. 94 in 1980-81 to Rs. 226 in 1984-85. If all the capital assets procured and accumulated over time are evaluated at 1984-85 prices, however, the gross fixed capital per tonne of coal output was Rs. 343 in 1980-81 and since risen to Rs. 439 in 1984-85.

Coal mining has become more capital-intensive going by the gross fixed capital output ratio which reached 2.4 in 1984-85 compared to 1.7 in 1980-81. In some under-ground long wall mechanised mines, the capital output ratios were ridiculously high at 22.4.

The actual cost of coal from new mines at Rs. 222 a tonne included capital-related charges of nearly 43 per cent. For the entire coal mine sector (including new and old mines), the actual cost at Rs. 190 a tonne in 1984-85 included capital related charges of nearly 23 per cent.

It is likely to go up further if current trend is any indication. For example capital related charges in 1986-87 are estimated to be 37 per cent for new mines as against 23 per cent in 1985.

Coal is thus no more cheap. Besides, it's quality has deteriorated.

Moreover, the disturbing trend is that the 'lead' per tonne of coal on an average has been increased from 568 km in 1980-81 to 643 kms in 1985-86. Besides coal prices, railway freight has also been increased. Against a pithead cost of Rs. 190 a tonne for 'E' grade coal from Bihar, the landed cost in Punjab comes to Rs. 610 a tonne, the railway freight alone being Rs. 420 a tonne.

It is therefore, clear that coal transportation constitutes a major cost to the consumer.

After a detailed analysis; the BICP concludes:

(1) The use of domestic coal as the primary energy input has run into problems due to escalating costs;

(2) Imported coal is more economical to use at shore-based power plants than using domestic coal if the lead distance involved is 850 km for "E" grade; 700 for "F" grade and 600 kms for "G" grade coal;

(3) Fuel oil prices at $ 16 and $ 18 a barrel is a cheaper energy source at shore-based power stations than imported coal. When priced at $18-$20 a barrel, the switch points are 1,000 km for 'E' grade; 800 kms for "F" grade and 650 kms for "G" grade coals;

(4) Natural gas emerges as the best option in the inter-fuel substitution analysis. Over longer distance, however, pipeline transportation costs dominate and reduce the viability of using gas;

(5) In the substitution exercises only normative costs of production of coal has been considered. The actual costs are higher and this would make the picture even more adverse for domestic coal and:

(6) When the cost for the consumer is corrected for quality variations, electricity generation from domestic coal is economically an expensive proposition from the consumers' angle.

Assam seeks higher royalty on crude oil

The Assam government has submitted a memorandum to the Union government to revise the rate of royalty on crude oil and provide additional funds of revenue on account of massive interestate stock transfer to tide over to some extent the financial crisis faced by the state.

Official sources say that the state is facing acute financial crisis following a large volume of expenditure on repayment of principal amount and interest to government of India against its loans besides payment of arrears on account of interim relief to the state government employees.

The sources said recently that as the inflow of funds was not keeping pace with the requirements of additional expenditure at the relevant time, the Assam government ran into overdraft which, however, had been wiped out recently.

The sources said that though the current spell of overdraft was now over yet for a lasting solution of the problem it was imperative for the state government also to augment its resources as far as possible.

Under the present arrangement no state government can remain in overdraft for a continuous period of seven working days.

If such a situation arises the RBI may stop payment on government transactions. Such an eventuality may arise whenever at any point of time there is an imbalance between inflow and outflow on government account.

The sources said that a number of state governments had cut down their plan expenditure to avoid this problem. The Assam government, however, did not reduce the plan expenditure in spite of
constraints.

"It is, in fact, in order t
rapid economic growth with
ject of clearing the backlog
velopment and for reaching
tional level that large scale
diture was undertaken by t
government with its limited
ces," the sources said.

SUPERCONDUCTORS : NEW MODEL DERIVED

A new model has been
by researchers at the Indian
tute of Science (IISc) to exp
mechanism behind supercon
ty, according to the IISc D
Prof. C.N.R. Rao.

The model showed that
and not copper was respons
the "mischief of supercondu
he said.

Speaking on "supercond
update" at the Bangalore
forum on recently, he said
he and Dr. B. K. Chakrabo
leading scientist settled in
had worked together at the
on the new model "oxygen
The postulates were recent
to a famous science journal f
lication.

He said his model did no
with that put forth by the
can Nobel laureate, Mr. Phil
ren Anderson. About 60 p
of the theoreticians the worl
had agreed with him over t
of the oxygen in supercondu
he said and added "oxygen
will stay".

Prof. Rao said his team ha
ved different systems which
conducts at temperatures as
300 K (27 degrees C). Th
tems also repelled magneti
but were not pure ones. T
ries each in the bismuth an
um systems were developed
team while the bismuth serie
ed superconductors at 78 K
and 100 K, those in thallium
bited superconductivity at 90
K and 125 K.

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OIL's output falls by 4 pc

of about 30 per cent of Oil nited's (OIL) drilling engi- favourable social environment and poor returns in terms of nt and production from age- lds, led to a shortfall of four in the company's crude oil n 1987-88.

umulative impact of these fac- that production came down to llion tonnes from the revised f 2.55 million tonnes. Addi- the indigenous drilling rigs to suffer teething troubles with the erratic behaviour of jan oilfields reservoir which is in lower production. The dril- gineers also continue to leave elsewhere in untroubled envir- t.

rding to an OIL release, the y declared a profit before tax 93.11 crores for the account- r 1987-88. This reflects an in- of Rs. 7.38 crores over the ar. OIL's profit-after tax in 19- s placed at Rs. 66.38 crores Rs. 50.60 crores in the previ- ar.

increase in the total income Rs. 451.36 crores in 1986-87 519.12 crores in 1987-88, the explains, is mainly due to the ar effect of increase in the price de oil to cater to the hike in rom Rs. 300 to Rs. 600 per ton- yable to the Central government. elease claims that due to better ement of investible surplus funds etter liquidity position, the inter- come on investments and depo- so increased from Rs. 213 lakhs 86-87 to Rs. 626 lakhs during r.

ng 1987-88, OIL's contribution state and Central exchequers een placed at Rs. 252.93 cro- a 15 per cent increase compar- Rs. 215.71 crores in the previ- ear.

Assam government stands to Rs. 66.74 crores in 1987-88 on nt of royalty and sales tax on the f crude oil. The Centre will re- Rs. 186.19 crores being the nt for corporate tax, cess and ex- uty, customs duty and dividend internal resources generated by ent up from Rs. 198.22 crores in 1986-87 to Rs. 208.29 crores in 1987-88. It spent Rs. 147.98 crores for expenditure towards exploration and development activities. This was funded internally.

The company's net worth increased to Rs. 466.08 crores compared to Rs. 403.90 crores a year ago.

For the tenth year in succession (excluding 1980 when the company went into the red following the pipeline blockade by the All-Assam Students Union), OIL the release said, would declare a dividend of 15 per cent for 1987-88 amounting to Rs. 4.20 crores.

Incidentally, OIL has so far exceeded the revised target of accretion of 25.75 million tonnes of hydrocarbon reserves in Assam and Arunachal Pradesh by establishing 38.74 million tonnes of hydrocarbons this year. Exploratory efforts have borne fruit in Arunachal Pradesh with the discovery of oil in Kumchai in 1987. A few new structures were discovered in Assam by exploratory drilling around Hapjan, Borbil, Diroi and Bazaloni. These have enabled OIL to add 30.78 million tonnes of oil and 7.96 million tonnes of oil equivalent of gas.

According to OIL, the company has fulfilled the Seventh Plan target of discovering 105 million tonnes of hydrocarbons in Assam and Arunachal Pradesh.

ONGC EXPENSES: REJOINDER TO UNION MINISTER'S STATEMENT

The Association of Scientific and Technical Officers, Madras unit of the Oil and Natural Gas Commission, has taken exception to the criticism of the functioning of the ONGC by the Union Minister for Human Resources Development, Mr. P. Shiv Shankar, in particular to his drawing a comparison with the Oil India Limited (OIL).

In a rejoinder to the Minister, the office-bearers of the association said that it was regrettable that Mr. Shiv Shankar, as ex-Minister of Petroleum & Natural Gas should have drawn comparison between a 'giant organisation like the ONGC with the OIL, a small company." The ONGC produced 27.92 million tonnes of oil a year as compared to OIL's 2.45 million tonnes during 1987-88, it pointed out.

Huge profits: "While agreeing that the ONGC earned profits, the Minister does not want to accept the basic fact that more persons are required to do more work," the association said. Though the price of crude oil had not been raised since July 1981, the ONGC made a huge profit after tax to the tune of Rs. 1,507.53 crores in 1987-88 due to its dedicated manpower and constant increase in productivity through cost control methods.

The dividend paid by the ONGC this year was the highest declared by any public sector organisation. Only Rs. 150 crores was spent on manpower in the ONGC compared to the Plan expenditure of Rs. 2,050 crores and tax payment of Rs. 3,700 crores to the government.

Magnitude of work :

Referring to the magnitude of ONGC's work, the rejoinder said, "ONGC is committed to development of the hydrocarbon resources of the country through intensive exploration activity. It deployed 105 rigs when compared to 20 rigs of OIL. Most of the ONGC rigs were deployed in exploration whereas OIL's rigs were in production. The ONGC was also running seven research institutes which provided R and D consultancy to several organisations in India including OIL itself. The exploration survey parties of ONGC, Southern Region, had achieved productivity of international standards.

"If ONGC has managed to produce 12 times more than OIL with only four times manpower, then, who is incurring unreasonable expenditure, we wonder", the association said in its press statement.

(The Union Minister had stated at a meeting in Hyderabad on July 24, "Everybody seems to say the ONGC earned profits. I will not dispute that, but when one looks at the number of persons it employed, it is four times higher than that of the Oil India Ltd., another public sector unit engaged in similar activity." He was of the view that a proper assessment of manpower requirement was essential. Saying that there was "tremendous unreasonable expenditure" in ONGC he advocated a thorough review of ONGC's "manner working")

COCHIN OFFSHORE :

ONGC drilling to resume soon

The Oil and Natural Gas Commission is expected to resume drilling in Cochin-high shortly.

A high-level team from the Commission will be visiting Cochin in this connection, according to State Government sources at Trivandrum.

Although the State Government is in the dark about the progress of the exploratory drilling in Cochin-high, the sources said that the results had been encouraging. The first well in the Kerala-Konkan offshore basin targeted to drill down to depth of 4500 metres was spudded on October 21, 1987.

The Union Minister of State for Information and Broadcasting, Mr. S. Krishna Kumar, who was on a visit to Kerala recently had also confirmed ONGC's plan to resume drilling operations off Cochin. According to information available in New Delhi, ONGC had discovered the presence of 1630 million tonnes of hydrocarbon reserve in the Kerala-Konkan offshore basin.

ONGC has however been silent ever since the drilling operations commenced in the Cochin-high structure in October last except for a press release issued some time last year. It had said that ONGC planned to drill around 12 wells by deploying four rigs in the area. The silence by ONGC since then and the communication gap between the Commission and the State had given rise to several rumours when the drilling operations were later suspended.

As on January 1, 1987 the prognosticated reserves of Kerala-Konkan offshore basin were estimated to be about 300 million tonnes. In the west coast 24 oil and gas discoveries had been made since 1980.

The first well on the Cochin-high structure was spudded by the US rig Dislin Field F-95 chartered by ONGC. This was in October 1987.

The potentially oil bearing Cochin-high was first discovered by the Soviet seismic survey ship Akad
shenglinsky in 1965. The Ke
kan basin occupies the vast
areas off the coast of Konka
and the Lakshadweep.

The Kerala Government, he
said, was fully aware of the
scope for development of the S
oil had been struck in Cochin
commercial drilling had com
Nevertheless no serious attem
however has so far been made
State Government to study it
sibilities or arrange to exploit th
tunities.

HIKE IN CPT CHARGES MAY ENGG. EXPORTS

Export of engineering good
Calcutta is likely to come to
standstill owing to the steep
port charges effected by the
ties.

By a notification in the
Gazette recently, the Calcutta
(CPT) effected massive hikes
ges on account of wharfage,
ing licence, sircar's licence,
lorries, dock permit hire, a
shipment ranging from
cent to 1900 per cent
for engineering goods and the
will hardly be able to bear th
ed burden.

According to the Chairma
Engineering Export Promotion
(EEPC), Mr. M.C. Shah, CP
ed the rates in its bid to st
cial self-sufficiency and in
regard of the port users' int

As it is, some of the e
goods which in the past use
through Calcutta Port from
areas, have already been
other ports.

It may be mentioned that
tern region used to pioneer
neering exports, accounting
cent of the total exports
sixties and seventies. Its
now stands reduced to 17
due to the various infrastruc
blems at the Calcutta Port.

The recent unprecedented
charges, Mr. Shah felt, wou
retard the growth of engine
ports from the region, EEPC
said, has urged the CPT au
to review the hike in char
duce it to a reasonable level
exports of engineering goods
Calcutta.

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o-Chloro Benzoic Acid
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OMPANY NOTES

IAR PAINTS UP
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international Paints PLC
ing decided to pull out of
he race for acquiring Sha-
Paints Limited, its Indian
ary, is on.

ording to available indica-
there are currently three
in the fray. Among
the highly diversified IEL
, is striving the hardest
ire Shalimar Paints.

also has an edge over the
since it already manufac
and markets paints under
and name "Dulux". The
competitor is a non-resi-
dian while the third is an
industrial house based in
stern region. Neither of
two have a paint manufac-
unit.

ording to corporate watch-
L has been negotiating with
lds Ltd., the holding com
of International Paints, for
time now. Negotiations are
ed to be progressing well.
ver, a precondition report-
ut forward by International
, that, whichever party ac-
the foreign shareholding
per cent will have to make
r to the Mehtas of Jardine,
ave a stake of a little over
r cent might prove to be
verbial fly in the ointment.
rporate circles feel that,
IEL might be willing to pay
sonably high price for the
eas holding, it might not
to pay large sums for Meh-
hares.

e main reason for IEL want-
acquire Shalimar Paints
be to double its turnover and become a strong number two in the industry after Asian Paints. IEL's international corporate philosophy, of being either the market leader or a close second, bears this out.

At present, the number two company in the paints industry is Goodlass Nerolac with a turnover of approximately Rs. 104 crores. IEL's earnings today from its paint units is around Rs. 60 crores. With the addition of Shalimar's turnover of Rs. 60 crores, IEL aims to occupy the second place.

It was with this objective that IEL had attempted to take over Berger India some time back. However, the present company of Berger — Williams Holding UK — at that point of time, wanted to dispose of all its units in Asia and Africa to a party willing to take the whole bloc together. IEL was reportedly not prepared to accept this.

Corporate observers point out that, with International Paints disinvesting, Shalimar will no longer have access to foreign technology in the field of marine paints, into which it had diversified in a big way. IEL, too, does not have access to foreign technology in this field nor does it manufacture marine paints at any of its units.

IEL has two manufacturing units, one at Rishra in West Bengal and the other in Hyderabad. Its licensed capacity for liquid paints is 13,150 kilolitres while

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actual production in 1987 was 9,693 kilolitres.

Courtalds, it may be recalled, held a little over 40 per cent in Shalimar Paints till the end of December 1977. Subsequently, in February, the following year, the overseas shareholders reduced their interest by selling a part to financial institutions.

Shalimar Paints' turnover last year, rose by 14 per cent to Rs. 59.54 crores from Rs. 52.28 crores in the previous year. Pre-tax profit after interest and depreciation was also higher at Rs. 2.19 crores compared with Rs. 2.01 crores in 1986. Profit after tax was up at Rs. 1.19 crores from Rs. 1.01 crores and the company declared a dividend of 20 per cent as against a dividend of 17.5 per cent in the previous year.

ULTRAMARINE AND PIGMENTS

The directors of Ultramarine and Pigments have stepped up the dividend to 20 per cent for the year ended March 1988 from 15 per cent paid last year.

The company has fared well during the year and sales turnover amounted to Rs. 757 lakhs against Rs. 752 lakhs. Other income was Rs. 81 lakhs against Rs. 92 lakhs. Company's exports on F.O.B. basis was Rs. 157 lakhs against Rs. 117 lakhs.

The company has earned a gross profit of Rs. 289 lakhs against Rs. 250 lakhs. After providing Rs. 31 lakhs against Rs. 27 lakhs for depreciation and Rs. 65 lakhs against Rs. 68 lakhs for taxation and after some justments, net profit available disposal was Rs. 194 lakhs a inst Rs. 155 lakhs.

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The proposed dividend absorb Rs. 36 lakhs against 27 lakhs & a sum of Rs. 22 la against Rs. 19 lakhs transfe to export reserve. The bala profit has been transferred to general reserve.

The company's reserves surplus amounted to Rs. 51 khs against the paid-up e capital of Rs. 180 lakhs w includes Rs. 165 lakhs wort equity shares issued as b shares.

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After other adjustments profit available for appropri works out to Rs 1.92 c against Rs 4.07 crores in previous year.

The dividend on equity sh has been maintained at 25 cent and on preference shar 13.5 per cent which will ab Rs 90 lakhs (same) and Rs lakhs respectively, and Rs lakhs (Rs 8 lakhs) has been sferred to investment allow

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SPOTLIGHT ON

Biotechnology & Life Sciences (Part I)

"M-Cap" Biopesticides Delivery System Developed By Mycogen Corp.

The public concern in USA about the safety of releasing live genetically-engineered bacteria into the environment has led Mycogen Corp. of USA to invent a new kind of genetically engineered product made from dead bacteria. Recently at a biotech conference, the company invented a novel process developed by researchers to kill the bacteria that turns them into tiny capsules containing an environmentally safe insecticide, or biotoxin.

Mycogen received two US patents for the invention in 1987. Called the "M-Cap" Biopesticide delivery system, the invention enabled Mycogen to become the first company to get EPA approval to field test genetically engineered bacterial pesticide.

Mycogen's researchers developed in 1987 a novel idea of killing its genetically-engineered bacteria to develop an effective biotoxin. However, Mycogen's biologists thought initially that killing the bacteria would destroy the cell wall and deactivate the insect toxin within. But company's researchers eventually developed a process combining heat and chemical treatments that killed the bacteria, while cross-linking the molecules of the cell-wall. In this manner, the researchers had not only solved the problem of containment of experiment, they also had invented a tiny, natural capsule that prolongs the effectiveness of the toxin.

Mycogen plans to complete final field tests and market the "M-Cap" system by 1990 (**CMR** 2/1/1988 pp. 7, 48).

A New Biotech Route To Sanguinarine

A natural compound of the blood root plant, Sanguinarine has exhibited antimicrobial properties effective in reducing and preventing dental plaque and gingivitis. Researchers at Vipont Research Laboratories Inc. (VRLI) report Sanguinarine has potential in other dental and medical applications based on additional properties discovered through recent clinical research.

The supply of sanguinarine from natural source (blood root) has been very limited. This shortcoming has greatly limited the rise of sanguinarine in dentistry. Now a new biotech process may make it possible for commercial production of this active drug in plenty. The new biotech route is based on a breakthrough by researchers at Plant Biotechnology Institute (Canada) for producing sanguinarine by secondary elicitation (extraction) from plant cell culture.

The PBI has signed an agreement with Vipont Research Laboratories Inc. (VRLI) at Fort Collins, Colo., USA to develop a commercial production biotech process for the compound sanguinarine. Incidentally, sanguinarine is the base compound in 'Viadent' brand of dental producs of Vipont Research Laboratories USA. The potential for extracting pure sanguinarine by the new biotech process will allow Vipont to greatly increase
production of the compou
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In a separate agreemen
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(**CMR** 2/1/88 p. 7).

Celltech's DNA Route To Essential Amino Acid To Commercialized In Japan

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an agreement in which
Kokan will use Celltech's
production technology to
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sential acid used to produ
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exected to grow in futur
2/15/88 p. 35).

Indigenous Production of Acid To Begin in USA By Genetic Research of US

The prospect for a d
source of lauric acid in th
is nearing thanks primar

partnership between Detergent Association researchers at Oregon University and the US Agriculture (USDA). rding to Dr. Steven J. of Oregon State Univer- phea domestication is the ractical, immediate and xpensive way of achiev- nestic lauric acid produc- Though domestication of is not dependent on ng the non-shedding va- production of the geneti- ngineered strain would e seed yields from 200 to according to Dr. Knapp. ports that induction of the necessary to obtain the hedding plants has been nstrated through the use mical mutagens both con- nally and via biotechno- echniques. The two routes bout equally efficient. But eferred way to heighten onomic viability of lauric ield, Dr. Knapp emphasiz- selection. For example, rogramme has selected the 10% of the germinating a laminuligera and creat- population with reduced dormancy and therefore sed seed yields. Dr. Knapp not exclude the importan- biotech means, but asserts ost immediate way to la- acid production is selec- (CMR, 2/15/88, p. 32).

or International Treaty rotect Genetic Diversity e Earth

ands for an international to protect the world's ge- diversity were made at the ational Union for the Con- tion of Nature & Natural rces (IUCN), an organiza- of scientific, government non-government bodies, ast February (1988) in Rica.

The draft treaty won the backing of the 1,000 or so participants at the conference. It proposes protecting sites with high biological diversity using funds generated by a levy on commercial and industrial users, of genetic material. It would also give countries the right to impose "reasonable charges" on the use of genetic material, a condition designed to please developing countries which want compensation for banning development in species-rich areas.

The complicated issue of compensation has been under discussion by the FAO for several years without clear result. The IUCN suggests charging profit-making individual companies or industry wide groups of companies either a fixed sum or a percentage of profits.

Scientists at the IUCN argue that genetic resources are better protected in situ, by preserving species in their natural habitat to protect the full range of genetic variability, an advantage not shared by conservation in gene banks, botanical gardens or zoos. Thus, the emphasis is on conservation of habitats and on obtaining funds for that purpose.

Participants also discussed preserving genetic diversity in developing countries through a "debt for conservation" plan, where banks are asked to donate bad debts to developing countries for use in conservation projects. Such a scheme is already under way in Bolivia (Nature 328, 373, 1987).

At least two international banks are seriously considering donating more than $ 1 million to Costa Rica for conservation, reports Costa Rica's Minister of Natural Resources. The Costa Rican Central Bank has agreed to pay 75 cents on the dollar for debt notes, in local currency, if the money is put into conservation projects. Costa Rica's government hopes to use the donation to restore more than 70,000 hectares of degraded pasture land to tropical dry forest in the Guancasts region.

Costs Rica's president, Dr. Oscar Arias, winner of the Nobel Peace Prize, told the Conference that preserving genetic diversity is especially important for biotechnology which can solve some of the more urgent problems of developing countries. (**Nature, 3/3/88, p. 8**).

A New Research Centre For Health-Care Biotechnology In India

A research centre for health-care biotechnology has been established in Bangalore last year by A B Astra. The research centre is named as Astra Research and is located at Bangalore. It is fully funded by A B Astra, the biggest pharmaceutical company of Scandinavia.

The long term objective of the Centre is to develop diagnostics, prophylactics and therapeutics for tropical diseases using recombinant — DNA and hybridoma technologies. Although the Centre is fully funded by A B Astra, it will be governed by a board consisting of equal numbers of member scientists nominated by A B Astra and the Government of India. A B Astra's desire to invest in India for research in biotechnology and molecular biology of tropical diseases stems from the awareness that India has much to offer in scientific competence and talent. Prof. J. Ramachandran, professor of biochemistry at the University of California and a former senior scientist at Genentech, has been appointed as chairman and

(Continued on p. 78)

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director of the research centre. (Trends in Biotech, 7/1987, p. [illegible])

Biohome From Chickens Developed To Entrap Enzyme

Researchers at a poultry processing farm in Canada have developed a bone matrix from chicken bone waste. This matrix can be used as a means of holding bacteria and enzymes for food manufacture.

Known as "Biohome" it is placed in an enzyme wash containing rennin for cheese making. The rennin by this process gets trapped in the porous long structure where it adheres naturally to the bone material.

Milk can be pumped through this matrix for cheese making in a continuous process.

Biohome was developed by Bioprotein Canada, the National Research Council of Canada and the University of Guelph. Development work is now proceeding to determine whether the process will work on an industrial scale. (**Process Biochem Prebiotech Supplement.** 1/1987, p. 111)

Biotech Process Plant Market In Europe By 1995

A recent study by Frost & Sullivan (UK) reviews the market for biotechnology process plants in Europe. This study estimates that by 1995 Europe will require some $ 2.5 billion in biotech equipment. West Germany is already spending almost $ 40 million/year, the UK $ 31 million and France $ 20 million on bioreactors, fermentors and downstream processing equipment such as mills for rupturing cell walls, membranes for separation of the process elements and ancillary products such as pumps and heat exchangers. In relation to the total European market [illegible] countries are included in the study — W. Germany represents more than 30% of demand, the UK about 10% and France 14%.

The study estimates that the total annual market for biotech equipment will nearly double between 1986 and 1996. From $ 180 million in 1986 it will reach $ 228 million by 1990. After 1990 the growth rate will jump to 8.9% annually. Spain is picked as the fastest growing national sector, though of the largest three, Germany will exceed the market average in yearly volume growth, the UK will parallel closely, and France will rise more slowly than Europe as a whole.

By equipment type, the largest component (fermentors and bioreactors), is also one of the fastest growing. This market is a combination of laboratory pilot plant and production fermentors — with about 30%, 40% and 30% shares respectively. A fifth of all equipment dollars go to liquid-solid separation goods, nearly two-thirds in filters.

Alfa-Laval Chernap is cited as perhaps the most important firm covering the whole range of equipments with APV Osborne, Craig, De Dauske Soker fabrikker and New Brunswick also figure prominently among the generalists. (**Supplement to Process Biochem.** 4/1987, p. vii)

West Germany's Anti-Acid Rain Programme Proves Highly Successful & Lucrative

West Germany's anti-acid rain programme has proved very successful and has even won kudos from the Centre for Clean Air Policy of USA, and has become the envy of the world. This all technology success may give West Germany a leg up in selling [illegible]

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in the coming year

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and (iii) exploiting the secretory ability of yeast strains, can be widely applied not only with brewing, distilling, baking and wine yeasts but also in the use of yeasts to produce novel biotech products. Spin-off from these studies includes valuable methods for differentiating or enumerating wild yeasts in brewery quality control. (**J. Inst. Brewing** 93(2), 1987 pp 91-96).

Biotech Production of Agarose On The Horizon

Ocean Genetics Inc., Santa Cruz, California has begun $ 2.5 million dollar expansion of its mass culture facilities. The company is gearing up for the production of agarose, which it will market later in 1988.

The biotech industry uses agarose extensively, both as biological culture media and in the separation and purification of complex molecules such as proteins and DNA.

Ocean Genetics reports that it has combined classical breeding with proprietary technology to commercially culture microalgae and macrophytic algae (seaweed) for the production of a range of products.

Until now agarose, a non-toxic polysaccharide, has been derived from certain red seaweeds that grow wild in oceans around the world. The Company is developing seaweed strains for production of agarose, as well as for pharmaceutical, agrichemical product screening and other applications.

Worldwide sales of agarose are estimated to be increasing by 25% per annum, due to projected growth of the biotech industry. The new process for agarose will not be dependent on natural populations of seaweed (**CMR** 3/21/88 p. 9).

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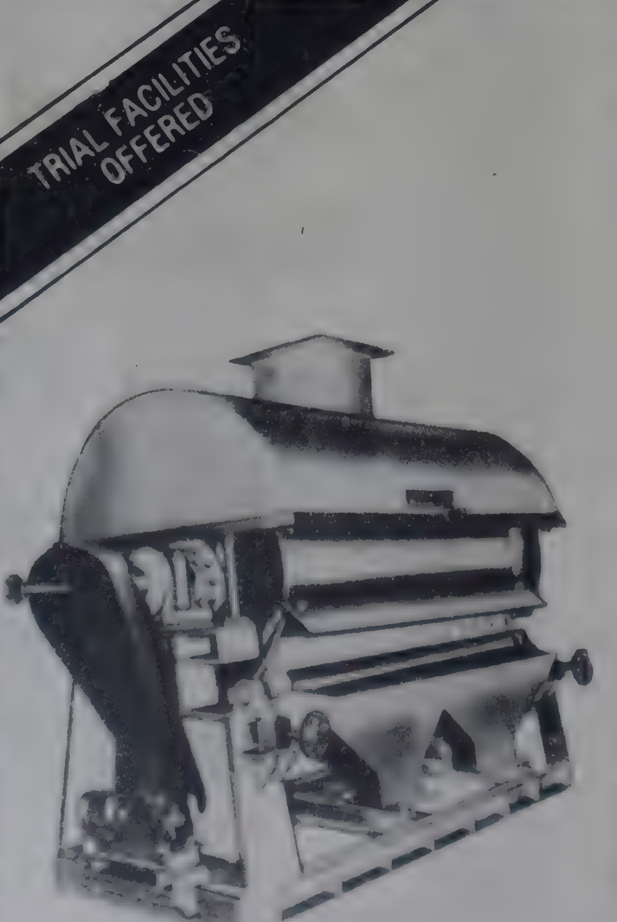

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Food & Pharmaceutical Technology in Perspective

PDATE ON WORLDWIDE UMPTION OF NATURAL COLOURS

US based Herald Organisa- management consultant firm aithersberg, Maryland has ly surveyed the worldwide t of natural food colours. Due ater awareness of toxicity of etic food colours worldwide, nsumption of natural food col- s poised for growth particularly uent countries.

e US consumption of natural colours is expected to total over illion pounds in 1988 with esti- d value exceeding $60 million. otal consumption worldwide is ned at 80 million pounds with exceeding $140 million. There- USA is by far the major and ng consumer of natural food rs.

e above survey groups natural rs in 4 categories:- (a) Carot- ds, (b) Centrospermal pigments, Anthocyanins and (d) Miscel- ous natural products. The study rs worldwide markets for 30 mercial natural colours.

is preference of natural food rs in affluent countries offer a d opportunity for developing rt market for natural food col- producers in India. The botan- resource of India present a good llenge to Indian researchers for eloping natural food colours from genous plants for world markets. n proper planning of R & D, India the potential for becoming ld's biggest exporter of natural urs. (*CMR*, 12/21/88, p. 4)

BLUE GREEN ALGAE MARKETED AS HEALTH FOOD IN JAPAN

Nippon Oil Co. has started marketing its 'Stylina' brand health care product granules produced from *Spirulina* (blue green algae). The company has developed its own in-house technology for mass-producing *spirulina.* These algae are grown on an idle site belonging to its Okinawa refinery.

Incidentally, these algae grow naturally in alkaline lakes in Mexico and lake Chad (Africa) and is eaten by local people. It is rich in protein and boasts a well-balanced content of amino acids, vitamins, mineral and chlorophyll.

The Company is planning to sell in 1988 around 20,000 units of this health food, each containing 800 granules. It will be a high-priced health food with a price of 4,800 yens per unit. (*Japan Chem. Wk.*, 3/24/88, p. 4)

BETA-CAROTENE — A NEW FOOD SUPPLEMENT IN LIMELIGHT

Another food supplement product beta-carotene has been the focus of much interest in recent months. The product which is a precursor of Vitamin A is claimed to offer some protection against cancer by its action of scavenging oxygen free radicals. The protective effect against cancer of the lung, skin and mouth has been suggested by a number of studies over the years and is still under investigation. In the UK, Britannia recently launched a new OTC beta-carotene product as Vita Brit available from health food stores and pharmacies. The product is sourced from Dunaliela algae, harvested in Hawaii and provides an equal mixture of the -cis and -trans isomers, the former is believed to be the active moiety. Synthetic beta-carotene contains mainly the -trans form and therefore, less in value therapeutically.

In addition to having a possible protective effect against cancer, beta-carotene also protects against sun-burn and aging of the skin. It also appears to stimulate the immune system and has been shown to increase the production of semen in bulls. (*Scrip.*, 7/9/88, p. 28)

SKIMMED MILK WITH SUNFLOWER OIL MARKETED IN BRITAIN

Since January, Pritchitt Foods, the largest privately owned dairy company in Britain has been providing a healthy alternative to whole milk by marketing "Fit 'n' Lite", skimmed milk with sunflower oil. This new dairy product has been developed to provide the consumer with the good elements of milk, eg. protein, calcium and riboflavin and yet reduce the highly saturated butter fat.

It was well known that only the very committed remained on low fat milks for any length of time because, the taste and appearance were considered far too watery. Fit 'n' Lite removes these shortcomings of skimmed milk. Sunflower oil was selected as a substitute to butter fat. The sunflower oil was incorporated with skimmed milk to provide polyunsaturated fatty acids by a special technique to provide proper flavour and stability.

WARNING LABEL ON FOODS CONTAINING MSG AND SULPHITES MOOTED

Sulphites and monosodium glutamate (MSG) have been proved to cause asthma attacks. During an asthma attack the air tubes narrow and the sufferer cannot inhale or exhale properly. An inadequate supply of oxygen reaches the tissues.

Sulphites, especially the salt, metabisulfite are commonly used as food preservatives. MSG is used to enhance the flavour of foods, partiucularly Chinese foods. MSG when absorbed into the body, affects the central nervous system. An attack of asthma could follow between 2 and 12 hours after ingestion of MSG. The harmful effects of MSG are increased if ingested on an empty stomach.

In Australia, the Food & Drug Authorities urge greater control over the use of sulphites and MSG and early introduction of warning labels on foods so that asthmatics can become aware of the dangers. (*New Sc.*, 5/19/88, p. 31)

BOTTLED COCONUT WATER TO HIT THE MARKET IN SOUTH INDIA

Bottled coconut water will soon be introduced in the Indian market. According to the Coconut Development Board, the product acceptability survey had been already completed in a few centres in Kerala, Karnataka and Tamil Nadu. The know-how has been developed by the Regional Research Laboratory, Trivandrum.

Though the cost of production and capital investment has been high, the sale price of the prodcut could be in the range of Rs. 2.00 to Rs. 2.50 per bottle. The shelf-life of the product is somewhat low and is around one month. (*Economic Times*, 20 Oct., 1987, p. 3)

A NEW ENZYME FOR PRODUCTION OF MONO-GYLCERIDES

The enzyme Pencillium Lipase C is now available from Biocatalysts Ltd., (UK) for the enzymatic production of high purity monoglycerides. This enzyme offers a simpler and more cost-effective alternative to chemical synthesis.

Enzymes are highly selective in their catalytic action and they offer benefits over chemical method of synthesis. Very little diglycerides are formed during synthesis with the enzyme, thus giving cost savings in the subsequent purification stages. Other uses of lipases as catalysts in chemical synthesis include both flavour and pharmaceutical production.

Penicillium Lipase C purified from *Penicillium cyclopium* demonstrates high specificity against monoglycerides with a pH optimum of 5.00 and temperature optimum of 40°C. (*Food Manuf.*, 1/1988, p. 17)

A SIMULATED DAIRY MILK BASED ON COCONUT SKIM MILK DEVELOPED

The Department of Science & Technology has developed a standardized process for a simulated dairy milk based on coconut skim milk.

The coconut skim milk is a liquid by-product obtained from the flesh of coconuts by aqueous extraction, followed by centrifuge separation of the cream. Department researchers reported that a series of tests had been conducted on simulated milk and that both chocolate and u voured versions received accep ratings from a taste panel. (*JAC* 1/1988, p. 64)

CHOLESTEROL-FREE EGGS THE HORIZON

Researchers in nutrition scie in USA have developed eggs unlike the regular kind do not levels of cholesterol. This new reduce triglycerides (fatty subs ces that contribute to heart disea

The developers of this new are Suk Y. Oh, an associate pr sor of nutrition and his colleagu the University of Utah. These eggs were produced by addin oil to the chicken feed. Hens th this fish-oil enriched feed for weeks laid eggs that reduced fats in a group of 12 people. ever, these eggs taste and sme fish. Researchers consider this minor snag, which can possib solved by feeding the hens de ized fish oil.

The American Heart Associ recommends that people ea more than 300 mg of choles daily because, its high levels in are linked to increased risk of ening of the arteries and c quently to heart attacks and str Just one regular egg averages mg of cholesterol.

Oh's study involved 12 he people with normal blood leve cholesterol and triglycerides. were divided into two groups, person eating 4 eggs daily for weeks. The first batch ate fis enriched eggs for the initial weeks, which appreciably re their blood pressure, but their cholesterol level rema unchanged. However, when switched over to regular eggs f last 4 weeks of the study, n their cholesterol levels incre

5 and 10% but their blood also shot back to their orig- e and their triglycerides se significantly.

esults of the second group arted first on a regimen of eggs and later switched he 'fishy' eggs were just the . At the end of 4 weeks their olesterol levels had dropped al and their blood pressure iglyceride levels also fell ably.

oil-enriched eggs, research- ort could be on the American as low-cholesterol egg sub- by 1989. However, this egg ute will be about 40% more r than regular eggs, because added cost of fish oil. The advantage of this egg substi- an be eaten in larger quantity t fear of increasing the risk of ping coronary heart diseases. , 6/1988, p. 26)

ES OF THINGS TO COME OD TECHNOLOGY VIA ECHNOLOGY

w will the food industry of the compare with that of today? chnology promises to play a al role in improving varieties of crops. More food plants may life in laboratory cultures before planted out in the field.

researchers learn more about ented foods and the enzymes onsible for their production, enzymes may be selected, ied or genetically improved to uce the particular properties we ire in food products.

wer chemical additives may be , but we will have to come to s with the fact that all food and is a mixture of chemicals. Will sumers appreciate that the word ral' does not in itself mean wholesome or safe? Will we want to develop a wider range of food crops, or will our natural caution lead us to a more restricted choice in our diet?

The trend towards more information for the consumers will probably continue, but will we examine more closely the logic of our requests? Tighter controls on the labelling of food may imply that newer methods of preservation, such as food irradiation, are more risky than older methods, such as chemical additives. Is this really logical or are we just happier with what we have grown familiar with?

Wider travels and better methods of communications should provide the opportunity for a more interesting and varied diet in all parts of the world. The food researchers will aim to apply minimal methods of food preservation.

FOOD IRRADIATION INCREASINGLY ACCEPTED AS A NEW METHOD OF FOOD PRESERVATION

Food irradiation is the latest alternative to heat as a way of inactivating microorganisms or parasites in food. As such, it may prove invaluable in the future for improving food preservation.

Short-wave ionising radiation from electrons, X- or gamma rays passes through food carried on a conveyor belt. As it does so, it inactivates or destroys microbes without cooking the food.

Extensive research has been done on food irradiation in projects funded by FAO, WHO, and the International Atomic Energy Agency (IAEA). Their Joint Expert Committee on Food Irradiation has recommended limits for food irradiation doses. The International FAO/WHO Codex Alimentarius Commission has also produced a recommended code of practice for regulating the irradiation of food.

The technique is already being used selectively in many countries. The USA and USSR space missions use irradiated food to prevent the possibility of food poisoning. Irradiated food is also provided in Britain to intensive care patients whose immune systems have for medical reasons been suppressed. Irradiation would not be used on all foods. It would complement existing methods of reducing contamination by microorganisms.

Insects and parasites are particularly sensitive to low doses of irradiation (less than 1 kilogray) Inactivating pests in stored food, particularly cereals, would improve food supplies by diminishing the amount of food damaged by insects.

Medium doses of irradiation (1 to 10 kilograys) could "pasterize" foods such as raw chicken; prawn and shell fish. This would inactivate or kill live Salmonella and Campylobacter. High doses of irradiation (greater than 10 milograys) would reduce bacteria and spores on spices where the safety of alternative chemical treatments is uncertain.

Fears have been voiced about the safety of irradiated food, in particular that such food would have unacceptedly high levels of radioactivity. However, research has shown that irradiation does not significantly increase the natural radioactivity of food. Nor would the technique be used on all foods.

Advantages of food irradiation are that it could improve safety, reduce spoilage, increase the shelf-life of foods and favourably modify the texture of certain foods. Disadvantages of food irradiation are that it reduces the levels of some vitamins, particularly vitamin C and thiamin. Low doses would not usually inactivate enzymes or viruses that cause food to spoil. Nor would irradiation normally render harmless any microbial toxins that are already present in food. The technique would not be used on very oily or fatty foods because, it oxides the fats and results in the food tasting bad.

Like all techniques in food processing, there are good and bad points about food irradiation. It must be left to the researchers and regulatory bodies to ensure that when irradiation is used, it is used safely to produce healthier food.

STOMACH ULCERS LINKED TO ULCER BACTERIA

A certain bacteria is found in the stomach of up to 90% of patients with gastric ulcers, according to Dr. Walter Rubin, chief gastroenterologist at the Medical College of Pennsylvania. According to researchers, while the role of this bacterium, *Campylobacter pylori* in causing ulcer disease is unclear, it is found in many more people with ulcers than in normal individuals. It is possible that the bacterium may play a role in making the lining of the stomach or small intestine more susceptible to the irritating action of acid secretions. (*Am. Druggist*, 4/1988, p. 90)

HUMAN GASTRIC LIPASE DEVELOPED BY A BIOTECH PROCESS

Celltech researchers have identified the existence of a human gastric lipase and trying to characterize it by molecular cloning and expression of the lipolytically active enzyme in yeast. Using genetic engineering, the company is developing a process for making this normally scarce enzyme in quantities for therapeutic use. The enzyme and the process are protected by patent applications.

Recently, it has negotiated an agreement to develop, manufacture and market human gastric lipase with an unidentified major international pharmaceutical company of West Germany. The initial agreement calls for the production of this lipase and to evaluate its therapeutic potential.

The Company's success in isolating human gastric lipases, an enzyme produced in the stomach and in cloning and expressing it could lead in future to a new therapeutic treatment for sufferers from cystic fibrosis and chronic panc
titis. Patients with the gastric
order, cystic fibrosis and those
pancreatitis (which may be brou
on by alcohol abuse) are unable
digest nutritional fats.

Current therapy is by oral ing
tion of a lipase enzyme preparat
derived from the pancreas of pigs
is expected that a product conta
ing human gastric lipase will
improved efficacy and lower dosa
than current therapy. (*CMR*, 2/8
pp. 5, 21)

MOGEN TESTS GENE SPLICE POTATO

Dutch plant biotechnology
Mogen International has been giv
the green light from the Dutch au
roties to conduct field tests with
genetically engineered pota
Mogen had originally been award
the necessary Nuisance Act licen
back in April but faced opposit
from the environmentalists organi
tion Stitching Natuur en Milieu. Th
appeal has now been rejected by
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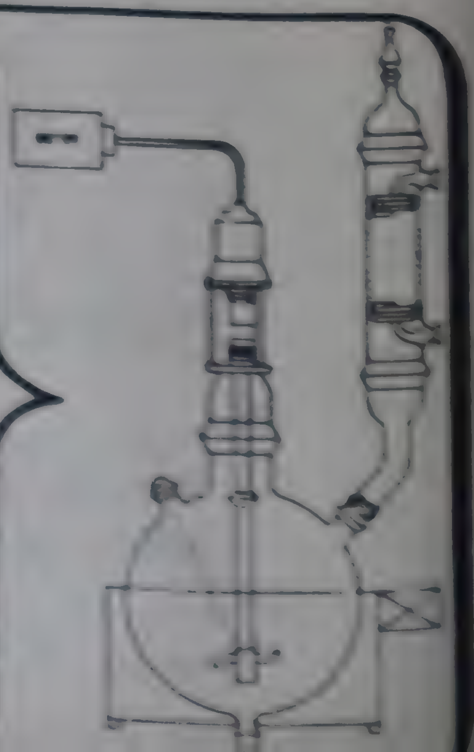

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Chemical News from Abroad

N CONFIRMS PLANS FIRST EUROPEAN PP T

xon Chemical is to enter the ean polypropylene market, plans to build a worldscale at its Notre-Dame de-Gra- hon complex in France. A design and engineering is underway, although no decisions on capacity or hology have yet been taken. bservers believe it could be 140,000 ton/year.

major debottlenecking pro- is currently in progress at Notre-Dame-de Gravenchon ker and Exxon says propylene stock for the new plant will vailable.

he spokesman hinted that the plant might have two lines both Exxon/Sumitomo and ont/Mitsui technology. In the Exxon has been guarded t its propylene balance and not yet clear how plans for new unit will affect its mer- t position in Europe.

xon plans to start market lopment work in Europe im- ately using product from its own, Texas plant. This plant based on Exxon/Sumitomo nology, but has been modi- to use Himont/Mitsui Petro- nical catalysts. A major ex- ion is already underway and city will rise to 450,000 ton/ by 1990, making Exxon the nd largest US PP producer Himont.

ny Gaskell, general manager Exxon TechPolymers, said were two reasons why Ex- is entering the European et. "Firstly, in the US Ex- is the major supplier of PP number of speciality applications and in Japan it benefits from its technology exchange and relationship with TSK. We want to use the strength of our global organisation to provide European customers with the same expertise and products.

"Secondly, the development of new polypropylene grades and processing techniques will continue to offer exciting growth and substitution opportunities, particularly in the performance packaging, automotive and health care markets, all of which are key sectors targetted by Exxon's worldwide polymer business."

One observer said that another PP plant would raise fears of European overcapacity, but said it was a "logical move for Exxon, especially with its speciality packaging expertise." An Exxon spokesman, however, said the company believed that projected European PP market growth of 6-7 per cent/year would continue through the mid 1990s and said there was room for a new producer.

European PP capacity stood at just over 3m ton in 1987 and, if all projected new buildings go ahead, a further 1.3m ton will be added by 1992. Recently DSM confirmed plans to construct a second PP plant at Geleen, the Netherlands.

Exxon Chemical has completed the acquisition of part of Akzo's Europoort facilities near Rotterdam, the Netherlands. Terms of the deal were not disclosed.

DU PONT STUDIES DME PLANT

Du Pont is studying plans to invest $5m in the construction of a new facility for the production of 50,000 ton/year dimethyl ether (DME) in Europe, probably Rotterdam. DME-based propellants can, in some cases, be substituted for fully halogenated chlorofluorocarbons (CFCs) and the proposal is in line with the US company's plans to stop CFC production by early next century.

Companies have recently intensified the development of replacements for CFCs which may have contributed to a 2 per cent decrease in the earth's ozone column since 1970, according to a recent study by the US National aeronautics and space administration.

Du Pont claims that its DME-based propellants, sold under the Dymel trademark, offer a number of advantages over aerosols containing CFCs. As well as being environmentally safe, DME is soluble also in water which helps to reduce aerosol manufacturing costs.

Another important compound HFC 134a is being produced in small quantities for customer application and toxicity testing in the US at the company's Chambers Works in Deepwater, New Jersey. Du Pont's European director of chemicals and pigments, Uwe Bohr, said the design of commercial manufacturing facilities for HFC 134a could begin by the middle of next year with the earliest possible construction date being mid 1990.

Du Pont currently manufactures DME at a facility in Charleston, West Virginia. If plans for the European facility go ahead, it will be in competition with UK Wesseling's plant in West Germany where production is set to double to 60,000 ton/year by the end of this year.

Current global demand for DME is around 100,000 ton/year and is well within current total capacity for the product. But if one or more major CFC users were to switch to DME, demand would shoot up and the market could be left in short supply.

REPSOL BUYS AISCONDEL STAKE

Banco Espanol de Credito (Banesto) has reduced its 50 per cent holding in Catalan PVC producer Aiscondel in two separate deals. It has sold a 20 per cent stake to Respol and a further 10 per cent to its partner in Aiscondel, Aragonesas. Industry sources valued the deal at between Pta3.5-4bn ($29-33m).

An Aragonesas spokesman said a further 10 per cent of the bank's stake was likely to be offered to the other partners in the near future. Its eventual aim was to be left with a 10 per cent holding in Aiscondel.

Banesto's move was not expected and has fuelled industry speculation that Respol acquired the stake in order to thwart a foreign buyer's intentions towards Aiscondel. The PVC producer's chairman Rafael Espanol said earlier this year that the company was seen as an attractive investment opportunity.

The company manufactures 150,000 ton/year VCM at Vilaseca, Tarragona where it also has production capacity for 50,000 ton/year PVC, currently being expanded to 80,000 ton/year. At its Monzon site Aiscondel produces a further 60,000 ton/year PVC and 25,000 ton/year polystyrene, acrylonitrile-butadiene styrene and styrene acrylonitrile.

In 1987 Aiscondel reported profits of Pta829m on sales of Pta20.7bn.

Meanwhile, Banesto, which is being merged with another major Spanish industrial bank, Banco Centrale, has been tipped as the likely buyer of ERT's Huelva refinery and the downstream petrochemical operations at the Huelva site.

The two banks already hold stakes in the Spanish refinery operations Petromed and Cepsa. The government is believed to have put pressure on the banks to acquire the Huelva refinery in order to keep it out of the hands of foreign investors.

When the KIO-Cros-Torras Hostench group gained control of ERT earlier this year, it was suggested that both the refinery and ERT's defence business would be sold off to Spanish interests.

AIR LIQUIDE BUYS DUTCH PLANT

France's L'Air Liquide has reached agreement with Philips in the Netherlands on the acquisition of the electronic firm's industrial gases facility at Eindhoven. Terms of the deal were not disclosed.

The deal is an important one for the French firm which lost its Dutch manufacturing operations for the merchant market when it terminated an agreement with Sweden's Aga in 1986 involving facilities in West Germany, the Netherlands and Belgium.

A spokesman at L'Air Liquide said the acquisition would provide a starting point for the company to expand its manufacturing base in the Netherlands. In the long term, the company says it will invest in rationalization, modernization and expansion of the operation which has sales of "tens of millions" of Dutch guilders and employs 50 people.

R-P LOOKS TO RAISE ACQUISITIONS CASH

Jean-Rene Fourtou, presiden of the French state-owned chemicals group, Rhone-Poulenc says the newly elected socialis government may approve moves to raise additional funding to bolster the company's acquis tions programme. The company is looking at acquisitions of between $200m and $800m..

While there is no question o fully privatizing the group, as favoured by Fourtou, the government may raise the ceiling o publicly-held non-voting shares t 50 per cent from the present limit of 25 per cent, and coul also approve an issue of votin shares.

Fourtou outlined the company's investment programme at the inauguration of its new process development centre in Decines nea Lyon. Rhone-Poulenc has invested F100m ($16m) over the last three years in the expansion and restructuring of the centre established, to scale up and improve the company's new processes.

CEFIC SUPPORT

The European chemical industry federation Cefic has urge EEC member states to suppor the commission's proposals fo a single set of regulations governing merger control within th community, with a view to th 1992 single European market.

Cefic stresses that, in order have any chance of success, th regulations must be the only system covering intra-EEC merge and should not be subject to parallel or further controls und national law.

EM AUGUSTA DETAILS
TIZATION PLANS

hem Augusta, the deter-
ntermediates company be·
g to state-owned Eni, is to
tially privatized. The Itali-
npany is to sell 25 per cent
shares to the public and
ans to seek a listing on the
bourse.

chem Augusta is included
merger talks currently un·
ay between Montedison and
em but chairman Lorenzo
said the move would not
he negotiations. Montedi·
efused to comment on the
any's plans.

move is aimed at raising
on ($28m) through the is-
f 30m common shares. The
g is to be underwritten by
sortium led by the merch-
ank Mediobanca SpA and
bility of overseas investment
lled by Eni. Foreign insti
s are also involved in the
rtium.

public offering of shares in
em Augusta had been dis-
d in 1986 but was delayed
the stock market collapse
ctober.

money raised is to be used
end Enichem Augusta's de-
nt intermediates production
outside Italy, to expand its
ct base and boost research
evelopment spending.

mpany sources said Enichem
sta had been studying the
lity of overseas investment
ad not yet taken any deci-
regarding location or the
cts involved.

company reckons to have
d 45 per cent of the deter-
intermediates market in
ern Europe. It is a major
cer of linear alkyl benzene
, a key raw material for detergents manufacture, with capacity for some 200,000 ton/year. Plants are located at Augusta in Sicily and Porto Torres, Sardinia.

Enichem Augusta also manufactures tripolyphosphate. But consumption of this intermediate is declining as detergent manufacturers try to find substitutes for phosphate-based compounds which are harmful to the environment.

Other products include n-paraffins, olefins and oxo-alcohols.

The Italian firm reported net profit of L18.2bn in 1987 on sales of L51bn and forecasts increases of nearly 9 and 15 per cent for profit and turnover respectively for the current year. Research and development expenditure was L30bn last year.

Eni is likely to follow a similar privatization path with other Enichem companies. Under the Montedison-Enichem merger plans, such a move would effectively reduce its 40 per cent stake in the new joint venture. Both companies have agreed to maintain a parity stake for three years, which would force Montedison to reduce its holding in line with Enichem. Since Montedison is still involved in an ongoing debt reduction programme, this could be a likely strategy for the partners to follow.

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Chemical Markets Abroad

PHENOL PRICES SOAR AS SUPPLY CRISIS WORSENS

Western Europe's phenol market is still being dominated by a strong demand pull from downstream products and increasingly strained supply, which has sent prices rocketing during the first half of 1988. The tight market situation is made worse by all the major producers having plants down for maintenance or debottlenecking work during the summer.

The last spot deal was reported at $1,350/ton over a week ago but prices are now being talked at $1,500/ton although there are few takers.

A couple of thousand ton of product are said to be available in Rotterdam and some material is expected out of the East bloc, particularly Rumania, in the near future. But general availability of spot phenol is not expected to improve greatly.

Many producers are unwillingly to offer contracts for the whole third quarter, afraid of losing out on future price rises. July prices are expected to be settled at DM 1750-1825/ton, up from levels of DM1555-1650/ton at the beginning of the year.

Another reason why producers are said to be unwilling to commit themselves to a long term price contract is that with product so tight producers have often to enter the spot market to cover commitments. By having a closer regulation of contract prices, producers are hoping to have a stronger influence on the spot markets.

An expected fall in demand for phenolic resins and bisphenol A has not materialised and demand from the construction and building materials industries continues unabated. With most plants working flat out to make up for shortfalls, in the short term capacity cannot be increased and any shutdowns will have an exaggerated effect on the market.

Several major phenol plants are expected to be down for maintenance in summer. Montedipe's plant is expected to be down for the last week in August and the first three weeks in September as part of an estimated 40,000 ton expansion programme. This is being followed by Phenol Chemie shutting down its plant throughout September for maintenance. And ICI is expected to be down at some point this summer.

The Far East and the US are also still experiencing a major supply shortfall, both being major players on the spot market. With so little spot product available European producers are tending to concentrate on filling their commitments to their contracted European customers and it is taking all resources to fulfill these commitments.

In the longer term, phenol markets should be eased by several new capacities, such as the proposed Mitsui 150-250,000 ton/year European phenol plant, which is expected to be on stream in 1990. The present leading producers are all planning major expansion and debottlenecking programmes.

Acetone, phenol's co-product is also experiencing a demand pull market, putting more pressure on plants. Prices for acetone were last quoted as rising to $420-$430/ton cif for spot material and reaching levels of DM 800-850/ton delivered.

KEVLAR START UP AT MAYDOWN, UK

Du Pont's 2,500/ton Kevlar para-aramid plant at Maydown Northern Ireland has started commercial production. After a test and checking programme, shipments to customers are expected to begin in July. The $60 m Du Pont plant also produces elastanes and synthetic rubber Kevlar is used for marine, aerospace and sports goods, the expansion of the Maydown plant is part of Du Pont's aim to develop its European market.

Until last month it was not certain whether Du Pont would be able to sell Kevlar in the UK because of unfavourable decisions in a patent dispute with Dutch aramids producer, Akzo. However a worldwide agreement has now been reached for the companies to sell their products competitively.

The European market for aramid fibres is currently estimated at 4,000 ton/year. Total world market is around 17,000 ton/year and may be worth between $400-500m.

CARMEL OLEFINS TO START SOON

Carmel Olefin's 130,000 ton/year ethylene plant at Haifa, Israel, which has been closed because of technical difficulties, is now expected to reopen in mid-July.

A team of experts has been brought to the Haifia site to supervise repair work and although the cause of the shutdown was not revealed, sources expect the cracker to be back on stream soon.

The outage of ethylene has affected supply to the company 100,000 ton/year polyethylene

nd production has been
ed due to difficulties in ob-
spot ethylene in the Medi-
an.

shutdown has also affect-
utarom, Israel's only PVC
cer, which obtains ethylene
Carmel for VCM produc-
Frutarom operates a 75,000
ear PVC unit at Acre and
s it will lose "millions of
s" by failing to supply its
ean customers.

CSION KNOCKS OUT ACC CRACKER

e critically tight US ethylene
et has taken yet another
k with news of an explo-
which has put Texaco Che-
l's 475,000 ton/year cracker
ort Arthur in Texas tempora-
out of action.

e cause of the explosion re-
s a mystery, but sources say
ncident occurred on June 24
compressor unit. Texaco
not said how long the unit
be down, but it is believed
the cracker itself is undama-
and could be up and running
n in a matter of weeks.

the meantime, Texaco has
ared force majeure on ethyl-
oxide and ethylene glycol
luced at nearby Port Neches.
tomers are receiving no sup-
of material at all at present,
tuation which will hit hard
aco's customers buying for
ethylene production.

owever, Texaco is due to re-
t 45,000 ton of mothballed
ylene capacity as the first sta-
of a restart programme of a
3,000 ton/year cracker at Port
ches, in July, which should
p alleviate supply shortfalls if
unit comes back on time.

SPANISH FERTILIZER IMPORTS ROCKET

Spanish Sertilizers imports jumped by over 70 per cent to 700,000 ton in the first quarter of 1988, according to figures released by Sorefersa, the government body established to oversee the restructuring of the Spanish fertilizer industry.

Producers are now demanding an EEC protection clause against imports until the domestic industry is on its feet again. The removal of tariff barriers since Spain joined the EEC has led to a flood of imports into the country.

Ironically, Spanish potassium fertilizer producers are struggling to export product to France, and legal wrangles continue despite a recent commission ruling in the country's favour.

The problems are further exacerbated by the complex restructuring of the domestic industry. A long delayed government report has recommended a further 10 per cent cut in production capacity at state-owned Enfersa. Cros' plans for the merger of its own and ERT's fertilizer interests as a government-backed company Fosforico Espanol (Fesa) are expected to be ready soon.

Meanwhile, the Kuwait Investment Office (KIO), which has a controlling interest in Cros is selling off ERT's Huelva refinery and is being forced to dispose of at least 50 per cent of the company's defence interests.

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Environment

EEC MINISTERS AGREE TiO_2 WASTE TIMETABLE

European environment ministers recently took strides towards curbing the discharge and dumping of waste acids from the titanium dioxide industry but failed to agree a text on the export of toxic wastes. The environment council agreed a common position on second stage standards for small car exhaust emissions and formally adopted the community directive on large combustion installations.

The ministers have accepted that all dumping and discharges of titanium dioxide waste acids should end by December 1989. Spain, France and the UK will be given permission by the commission to delay this ban until the end of 1992. Spain dumps waste acids at sea while the UK and France discharge the wastes into the sea. The UK may be even given a six month extension to this compromise. While the council was also able to make these important decisions a detailed directive covering the subject still needs to be adopted.

More disappointing for the Dutch government was the failure of the council to agree a text on the export of toxic wastes to developing countries. Ed Nijpels, the Dutch environment minister, had been urging for a total ban of waste exports to certain developing countries. The UK government again proved the major block to progress, arguing that toxic waste export is a legitimate business provided it is carefully controlled and the importing country has given its consent.

Nevertheless, the ministers are backing the commission's efforts to negotiate an international convention on toxic waste, under the auspices of the UN environment programme.

The European trade union confederation (Etuc) has joined in the call for tougher legislation to control the export of hazardous wastes. Etuc alleges that lack of international regulations on the export, stockpiling and processing of dangerous wastes is allowing some companies to profit at the expense of the environment.

Etuc is calling on the commission to push for a ban on exports and ensure that directives are applied strictly. The confederation highlights the transfrontier movement of dangerous waste and believes that the EEC should also cooperate more actively with Efta countries.

At the environment council meeting the ministers did agree to standards acceptable to all member states for exhaust emissions from small cars. The standards already imposed for medium size cars will now apply to small cars. The council is also committed to reviewing the situation at the end of 1991. This agreement allows the commission to introduce the whole of the directive on large combustion plants.

LOWER SAXONY FORMS WASTE FIRM

The West German state of Lower Saxony has developed a new concept for disposing of toxic waste. Plans call for the state to take over responsibility for disposal of hazardous production residues from industry.

A new company, Niedersuachsische Gesellschaft fur Sonderabfall-beseitigung (NGS) in which the state will hold a 51 per cent stake, has been established to collect and dispose of the estimated 100,000 ton/year of toxic waste produced in the st
til now, waste has been t
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positing sites.

In future, companies p
toxic waste must prov
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and decide whether the
should be deposited, inc
or recycled.

The state plans to in
uniform prices for waste
al. Firms with their own
waste disposal facilities
be exempted.

HUNTSMAN LINKS WITH LUMMUS CREST

Huntsman Chemical an
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The combination of Hu
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in the UK. Huntsman is
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Biotechnology

STARTS AIDS TRIALS IN HUMANS

ba-Geigy and Chiron ture Biocine has started inical trials of a poten- vaccine in Geneva, Swit- This is the fifth vac- e tested on humans but on of experts at the re- , conference in Stock- hat the prospects for an vaccine are diminishing.

iocine vaccine has al- mpleted animal studies now be tested on 25 rs. The company also start tests with the vac- e US later this year. The said the volunteers will risk from the trial as the does not contain the in- virus. The potential vac- believed to contain more of the non-infecting vir- ns.

ing an effective vac- inst the killer virus will as the virus has a re- for being variable, ac- to Gordon Ada a viral expert with the World organisation. Moreover, ability to get into tar- quickly also poses pro- There is evidence that y transmit the virus di- that a vaccine would culty tracking it down.

more worrying is the e that no chimpanzee tre- th vaccines based on teins or other vaccines n protected against Aids n. Other trials include the vaccine, Daniel controversial killed vir- an idiotypic antibody to Human trials have tage of chimpanzees, which are not able to develop Aids after infection anyway. For this reason the search for alternative animal models is stepping up.

A joint EEC working group has been set up to develop a model for conducting animal tests with Aids vaccines and drugs. Scientific institutes in four countries are now participating in the three year project which is being coordinated by the German primate centre Deutscher Primatenzentrum (DPZ).

Other participants are the primate centre of the radiological institute in Rijswijk, the Netherlands, the Paris-based Institute Pasteur and the national institute for biological standards and control in Potters Bar, UK. The Madrid-based Instituto de Salud Carlos III will join the EEC funded project shortly.

According to DPZ, the goal is to select a suitable test animal, a lower primate or rhesus monkey, which is "an essential pre requisite for experiments leading up to clinical trials with a drug". The basis for the research is that these apes are host for the Aids-related Simian immune deficiency virus.

All the institutes will work with the same family of virus, using uniform methods, so that results can be compared and interpreted. The lack of parallel experiments has been one of the major problems impeding Aids research to date, says DPZ's professor Gerhard Hunsmann who heads the project.

Hunsmann believes that the cooperation will also reduce the number of test animals required. The working group will also co- and outside the participating countries as well as universities and clinics.

BBL LINKS UP WITH PFIZER

British Bio-Technology, the Oxford based health science company has just signed two commercialization agreements. The first is a three year $2.5m ($4.5-m) research collaboration with Pfizer to investigate new aspects of vascular biology.

Under the agreement Pfizer will sponsor a fundamental research programme to be based at BBL's Laboratories in Oxford and Pfizer's research centre in Sandwich, UK.

Dr. Barry Bloom, President of Pfizer central research in Connecticut, US, said: "The significant breakthroughs occurring in the fundamental understanding of vascular endothelial biology could dramatically alter therapeutic approaches to a number of important diseases."

Pfizer, will develop and sell therapeutic products that result from the programme while BBL will receive royalties on worldwide sales. Both companies have rights to develop and sell new diagnostic tests based on discoveries from the research and BBL will have the opportunity to make and sell certain molecular biology reagents.

The second agreement is with Ultra-University of Liverpool Technological and Research Applications Limited. It grants BBL exclusive worldwide distribution rights for Liverpool University's Ultra Hapten range of products. These are very specific reagents used to detect biotin molecules which are used to label DNA or other proteins. They are based on a monoclonal antibody to biotin and have a market with research scientists. Terms of the agree-

News About New Projects

IRAQ SET TO BUILD $2BN PETROCHEMICAL COMPLEX

Iraq is set to invest $2bn in a world-scale petrochemical complex. The project, the country's second petrochemical production centre, will be located near the capital Baghdad, away from the Gulf war zone.

Osama Hamadi, general director of Techcorp, the government agency handling the project for the State Enterprise for Petrochemicals, said that a technical consultancy contract is soon to be awarded. International engineering companies such as Bechtel, Toyo Engineering, Technip, TLP and Lummus, are competing.

Although the project's configuration has not yet been fully defined, plans call for the construction of a 450,000 ton/year ethylene plant and a number of downstream units. The cracker will be fed on different liquid oil products from the country's central refinery near Baghdad.

Downstream units will produce 160,000 ton/year of polyethylene, 100,000 ton year of polypropylene and 120,000 ton/year of polystyrene.

The project will also comprise an aromatics complex processing approximately 400,000 ton/year of reformate from the central refinery in addition to pyrolysis gasoline of the ethylene plant. The benzene, toluene and xylene fractions will be processed into a whole range of fibre intermediates and manmade fibres.

Following the award of the consultancy contract, which is expected very shortly, Techcorp will place the first contract to build the ethylene plant. This, Hamadi says will be awarded this year, with construction beginning next year. The first units are expected to come on line in 1991.

Around half the output from the complex will be consumed domestically and the rest exported. Finance is expected to be in the form of credit lines, buy back from the plants and commercial loans.

The consulting contractor will be expected to assist Techcorp with the project's definition and processes. The company will also help Techcorp in negotiations with licensors and assist it in establishing contact with licensors/producers in negotiating finance, product buy-back and marketing agreements.

In addition, the consultant will assist with the preparation of tender specifications and the evaluation of bids. The technical assistant will have the right to offer its own processes and services.

Iraq's first petrochemical complex at Basrah has been completed but is not operating because of the Gulf war. Built by a team of Lummus and Thyssen Rheinstahl Technik, it is based on a 150,000 ton/year ethane cracker and includes a 60,000 ton/year PE unit.

JAPANESE FIRMS BOOST LYSINE

Two Japanese firms are expanding lysine production capacity to meet the world's growing demand for this essential amino acid used as an animal feed supplement. Kyowa Hakko, the fermentation technology firm, has established a joint venture, Hungarian Japanese Fermentation Industry, to produce and sell feed-grade lysine.

Partners in the venture are two Hungarian concerns including Hage, an agricultural co-operative; the IFC, an affiliate of the World Bank; Toyo Menka, a Japanese trading house and Kyowa Hakko.

The latter is supplying the technology for a new 5,000 ton/year plant to be built in Hungary. This new lysine unit should be on stream in early 1990. The Hungarians are taking a 65 per cent share in the venture with IFC taking 15 per cent and Kyowa taking 13 of the remaining 2 per cent. Total investmen amounts to $45m with a Japan ese firm winning the open ten der contract.

Kyowa is also expanding i lysine capacity at two of its othe three lysine production sites. Bio Kyowa the Missouri, US base subsidiary of Kyowa, is uppin its capacity from 7,500 ton/yea to 13,000 ton/year, while Fe mentaciones Mexicanas of Mex co is expanding from 6,000 10,000 ton/year.

The other Japanese firm, Aj nomoto, is hiking capacity two of its four lysine plants. Th first, Ajinomoto Co (Thailand) nearly doubling its annual lysin production capacity to 6,00 ton/year by July 1989.

The other, Heartland Lysin Inc, a joint venture between Aj nomoto and Orsan of Fance, w increase its Iowa plant's capaci from 7,000/ton to about 12,00 ton by August of next year. Th first expansion will cost ab $30m and the second, $76m.

Meanwhile in France, Eurol sine SA, the other Ajinomoto-O san venture has already increa ed its capacity to 40,000 ton an accumulated cost of $267 and plans a further hike to 5 000 ton/year. "If the market co

o grow steadily," Ajino-
id, "the Ajinomoto group
sider not only further ex-
cf the existing facilities
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e is one of the most im-
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productivity.

NT LICENCE FOR AN PE

Pont Canada is licensing
roup's Sciairtech IldPE/hd
hnology to Taiwan's Asia
er Corp. Under the terms
licensing deal, the third
by Du Pont in 1988, Asia
er will build a 100,000
ar PE plant at Lin Ruan,
n.

mates suggest that, depen-
on existing facilities, total
could be between $40-80m.
a Polymer is an associate
iwan's China General Plas-
orp, a group of companies
acturing a range of plas-
oducts from polymer resins
s. The group has sales
hout Taiwan, South East
and the US and turnover is,
ated to be around $1bn.
Polymer operates a 100,000
ear Gulf Oil technology ld-
ant at Lin Yuan.

edstock for the new plant is
ted to come from the near-
hinese Petroleum complex
Yuan which has ethylene
ty of around 600,000 ton/.
But sources says there have
some problems with the
ers and Asia Polymer may
to import feedstock.

far this year, Du Pont has
sed Sclairtech technology
ew PE plants in Brazil and
. In total, eight licensing
have been signed and five
plants in the US, Canada and Italy (Enichem) are producing around 600,000 ton/year PE.

UHDE SWISS DEAL

The Swiss Pulp producer Attisholz has placed an order with West Germany's Uhde for the conversion of its mercury cell electrolysis plant to the Hoechst-Uhde membrane cell technology.

The plant has a capacity of 24 ton/day of chlorine and energy savings of nearly one-third the present power consumption are expected.

EXPANSION FEVER GRIPS FAR EAST PETROCHEMICALS

Observers in the Far East see South East Asia's petrochemical industry as being gripped by a fever of expansion as demand grows.

Indonesia has 14 projects planned or in preparation, requiring total investment of $3.8bn, according to industry minister Hartarto. These are in addition to seven under construction at a cost of $773m, he said in Jakarta. The seven being built will produce vinyl chloride monomer, ethylene dichloride, PVC, paraxylene, benzene and various acids.

A formic acid plant with capacity of 10,000 ton/year is expected to begin production later this year, Hartarto said. A 20,000 ton/year polyol plant built as a joint venture with Arco is also to begin operation this year.

Construction of Indonesia's first chloralkali complex located in western Java, is expected to be completed next year, the minister said. It will produce 150,000 ton/year of VCM, 70,000 ton/year of PVC and 130,000 ton/year of caustic soda.

A synthetic rubber plant is scheduled for completion in 1990 with a capacity of 25,000 ton/year of styrene butadiene rubber. The paraxylene project in central Java is designed for production of 270,000 ton/year, plus 123,000 ton/year of benzene and 23,000 ton/year of LPG, the minister said.

Across the Malacca Strait, Malaysia's state energy monopoly, Petronas, is seeking foreign partners to help it enter the petrochemicals sector. "Success in expanding the petroleum and petrochemical industries will depend to a large extent on our ability to get others to join in sharing the risk," says Petronas president Azizan Zainul Ariffin.

During a local interview Azizan said Petronas was "cautious" in embarking on petrochemicals production because of the poor performance of the industry in the past decade. Now, however, he notes "an upswing in demand and shortage of certain basis chemicals."

Further south, Singapore is the region's major petrochemical centre. The Polyolefin Company (TPC), a producer of propylene and polyethylene at the Palau Ayer Merbau petrochemical complex, is planning to spend Sing$70m ($35m) to increase output of its plants in the light of strong demand.

The company recently reported a profit of Sing$134m for last year after years of losses. The upstream company, Petrochemical Corporation of Singapore, which operates the Singapore ethylene cracker, also finally reported profits last year of Sing $108m.

Another company at the island petrochemical complex, Ethoxylates Manufacturing Pte Ltd, a joint venture with Albright and Wilson of the UK, is to spend Sing$1m on upgrading its plant only six months after start up. "The expansion has to take place earlier than planned to meet the requirements of the market," said the managing director, Foo Sei Seng.

CARBIDE TO INVEST $450m

Union Carbide plans to invest around $450m in its US operations in the coming years. The major spending plan involves on outlay of up to $400m boosting ethylene oxide/glycol capacity by a further 500,000 ton/year, taking total capability for ethylene oxide to 1.6m ton.

Two other projects include a Unipol process reactor to produce a new family of rubber-like olefin "flexomers" and a 23,000 ton/year compounding plant for electronic products. Both will be built at Carbide's Seadrift, Texas complex at a cost of $50m.

Planned increases in ethylene oxide will be made in multiple increments and Carbide intends to phase them in, as market conditions warrant, into the 1990s.

Phase one, which will boost capacity by over 70,000 ton by the end of 1989, involves debottlenecking projects at Seadrift and Taft, Louisiana.

Overall, the total new capacity increases will be obtained through a combination of catalyst improvements, low cost debottlenecking at existing sites and new operating units. New plants could be built either within Carbide or in joint ventures with others, the company said.

The flexomers' project at Seadrift will provide Carbide with a "stepping stone into EP rubber and other elastomer businesses", according to chairman Robert Kennedy. He said a 100,000 ton year polyethylene reactor will be converted to flexomer production, while retaining the capability to make polyethylene.

Kennedy says the unusual combinations of toughness and flexibility possible with flexomers will open up new polyolefins markets for hoses, liners and high-performance films.

The compounding plant planned for Seadrift will be "state-of-the-art" and will produce medium and high voltage semiconductive products for the power cable market. Completion of the facility is planned for late 1989.

Carbide wants to be the leading world producer of EO and EG and derivates into the next century.

ICI STEPS UP BATTLE FOR PTA PROJECT

ICI has increased its efforts to win a purified terephthalic acid (PTA) project in Thailand.

Rival contender for the project, Mitsui — said by Thai sources to be the outsider — sought to bring pressure to bear on its own behalf by threatening to withdraw from a previously agreed plan to build an ethylene glycol (EG) plant in Thailand.

Mitsui was awarded a licence to produce 90,000 ton/year of EG at an investment cost of Baht-2.8bn ($112m) by the state board of investment, which offers tax and other incentives to foreign companies undertaking authorized projects.

ICI now says it will undertake this project if Mitsui carries out its threat to drop the ethylene glycol plan. "ICI has declared to the board of investment its strong interest in filling the gap," said a company statement released in Bangkok. ICI says that while it is not seeking privilege for production of ethylene glycol it considers the product to be an inh ent part of its integrated pe chemical business.

The Thai government has s that only one PTA plant will authorized — Amoco, the m ket leader in the region, is b ding alongside ICI and Mits — but has delayed a final de sion at least twice. On one oc sion it suggested that bidd "sweeten" their offers.

The Japanese company re ponded by saying it would prepared to cut its stake in project from 35 per cent to per cent and seek a local st exchange listing for its Thai s sidiary. ICI revised its propo cutting the length of the tax h day it seeks and pledging l investment.

Amoco is not known to h made any further proposals si sending a highlevel team fr Chicago and Hong Kong to p for the TPA plant.

FINA BOOSTS PS

Fina Oil & Chemical Co h announced a 136,000 ton y polystyrene expansion project its Carville, Louisiana, poly and monomer complex, sched ed for completion in July 198

A previously announced p ject for 77,000 ton/year PS pacity is now under way and w be completed in the fourth qu ter of 1988. Total PS capacity the site is expected to rea 290,000 ton/year next year.

These plans, together with previously announced projects debottleneck the Cosmar styr monomer plant by 182,000 t year to 863,000 ton/year and per cent expansion of the La P te PP plant, will further stre then the company's position the plastics industry, accord to James Comeaux, vice p dent chemicals

ARKET INFORMATION

Solvents Shoot up

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent — and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

prices of solvents like benzene, toluene shot up sky high in the y Chemicals Market. The ma- ppliers like IOC, IPCL have not egularly supplying these mate- ccording to market sources. e touched Rs. 15 while toluene and xylene were quoted at Rs 19 and 17 respectively. Glycerine continued to be in short supply with the Lever plant under lock out. Phenol too moved up to Rs. 35. Owing to seasonal demand copper salts were in limelight. Acetic acid was quoted at Rs. 15.

Dyes intermediates like K-acid, Tobias Acid and MPD were in short supply.

(Prices as on 28th July 1988)

STRIAL CHEMICALS	Per kg.
nium sulphate	2.00
nium phosphate (Mono)	14.50
nium phosphate (Di)	12.00
nium carbonate (Di)	17.00
nium bicarbonate	4.75
nium chloride	3.00
nium nitrate	3.50
c white powder	21.00
mide (Resale)	59.00
n carbonate	6.00
ing powder (33% Cl)	4.00
Borax (Granular)	13.50
Borax (Powder)	21.00
Boric acid (Tech.)	21.00
Bisphenol-A	69+ST
Butyl carbitol	48.00
Caustic soda (Flakes)	9.20
Caustic soda (Solid)	8.00
Caustic soda (Lye)	7.00
Calcium chloride 70% (solid)	3.25
Calcium chloride 75-80% (fused)	3.50
Calcium chloride 96% (Anhydrous)	5.00
Calcium Carbonate PPT	3.00
Calcium carbonate (Activated)	3.55
Camphor (Indian)	82.00
Cresylic acid	50.00
Cream of Tartar (Tech.)	70.00
Citric acid (Belgium) (Resale)	43.00
Citric acid (Indian) (Resale)	42.50
Copper sulphate	21.00
Chromic acid	48.00
Cyanuric chloride	120.00
Cobalt oxide	280.00
Carbitol	60+ST

For Your Import Requirements Of :

ANISIC ALDEHYDE 99%

From Japan

2-CYANOPYRAZINE

From Japan

Please Contact :

AGARWAL CHEMICAL AGENCIES

(Global Indentors)

17, Babu Genu Road, Shamaldas Gandhi Marg,

BOMBAY-400 002.

Tele: 316968 Telex: 011-76307 BUJO-IN

Ethylene urea	56.00
Ferric chloride (Lumps)	7.00
(Anhydrous)	16.00
Glue flakes	8.45
Glue sheets	6.75
Gohsenol GH-17	130+ST
Hydro (Resale)	41.50+ST
Hyflosupercell	24+ST
Hexamine (Resale)	35.00
Industrial Wax	25.00
Litharge	15.00
Lead Acetate (Tech)	28.00
Lithopone	15.50+ST
Magnesium chloride (Crystal)	1.00
Menthol crystal (Flakes)	185+EX.+ST
Menthol bold	205+Ex.+ST
Menthol crystal bold	245+Ex.+ST
Magnesium carbonate (Japan)	16.00
Magnesium carbonate (Indian)	15.00
Maleic Anhydride (per kg) (Resale)	48+ST
Mercury (75 lbs.)	10500.00
Nickel chloride	90.00
Oxalic acid (Resale)	22.00
Peppermint oil (Rectified)	90+Ex.+ST
Potassium carbonate (Indian)	19.00
Potassium carbonate (Imported)	21.00
Potassium bichromate	22.00
Potassium phosphate (Mono)	14.00
Potassium phosphate (Di)	14.00
Polyvinyl alcohol (No. 117)	120+ST
Polyvinyl alcohol (No. 173) (Resale)	130.00
Polyvinyl alcohol (No. 208)	115.00
Paraformaldehyde (Resale)	20+ST
Phthalic anhydride 36% (Resale)	24.00
Pentaerythritol (Resale)	51.00
Paraffin wax (Resale)	14.50
Rangolite (German)	80+ST
Rangolite (Czech.)	54+ST
Sodium sulphate (Fine)	6.00
Sodium sulphate (Coarse)	5.00
Sodium sulphide 50-52% (Flakes)	8.00
Sodium sulphide 58-60% (Flakes) (TCL)	21.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale)	700.00
Sodium chlorite 80% (Spain)	90.00
Santobrite (Indian)	36.00
Soda Ash (Tata)	4.00
Soda Ash (Birla)	3.80
Soda Ash (Imp.)	3.50
Sodium bicarbonate	5.25
Sodium bisulphite	4.50
Sodium silicate	3.00
Sodium acetate	6.00
Sodium alginate	150+ST
Titanium Dioxide (Anatase)	50+ST
Titanium Dioxide (Rutile — RCR_2)	70+ST
Tartaric acid (Crystal)	94.00
Trisodium phosphate	4.80
Thiourea	77+ST
Urea (Tech)	2.75
Zinc Dust	30.00
Vacuum salt	1.00
Zinc Oxide	30.00
Zinc chloride powder (technical)	14.00
Zinc sulphate	4.00

SOLVENTS	Per kg.
Acetic Acid (Glacial) (Resale)	16.00
Acetic Anhydride (Resale)	25.00
Acetone (Resale)	15.00
Adipic Acid	52+ST
Aceto Acetanilide	50.00
Aniline Oil (Resale)	50.00
Benzoate Plasticiser	45.00
Butyl acrylate	88+ST
Butyl stearate	36.
Butanol (Resale)	34.
Benzyl Alcohol	60.
Benzyl chloride	34.
Benzo trichloride	16.
Benzoyl chloride	22.
Bromine Liquid	42.
Chloroform	25.
Carbon Tetrachloride	17.
Cellosolve	45+
Cyclohexanone	53+
Cyclohexanol	43+
Diacetone (Resale)	35.
Diethyl Oxalate	34.
Diethylene glycol (DEG)	45+
Dioctyl Phthalate	52.
Diallyl Phthalate	56.
Dimethyl Phthalate	28.
Dioctyl Adipate	52.
Dibutyl Adipate	42.
Dipentene	15.
Dimethylamine 40%	12.
Dimethylamine 60%	14.
Ethyl Acetate	21.
Ethyl Acrylate	49.
Ethylene Dichloride	11.
Ethylene Glycol	41+
Formic Acid (Imp) (Resale)	29.
Formaldehyde (Resale)	6.
Glycerine (CP)	53.
Glycerine (IW)	48.
Hydrogen peroxide 50% (Resale)	29.
Isopropyl Alcohol	17.
Iso Butyl Alcohol	28.
(Resale)	30.
Monoethanolamine (Resale)	49.
Melamine	55+
Methyl Ethyl Ketone	55.
Methyl Isobutyl Ketone	36.
Methyl Acrylate	42.
Methyl Dichloride (Resale)	23.

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Sodium Naphthionate

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ACRYLIC DYES

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Sodium Sulphide Flakes

58-60%

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Tele: 346191, 324515

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Factory: Plot No. N-27, MIDC, Tarapur Industrial Area, Boisar, Dist. Thane, (Maharashtra)

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MAGNESIUM STEARATE BP 80
ZINC STEARATE
ALUMINIUM STEARATE
COPPER SULPHATE IP
DRIED ALUMINIUM HYDROXIDE IP
MAGNESIUM HYDROXIDE POWDER IP
ZINC CARBONATE

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AI

ARUN INDUSTRIES

303-A, Vrindavan, Ramachandra Lane, Malad (West), Bombay-400 064.
Phone : Office : 6820559/6820422 Telex : 011-78081 ARUN IN
Gram: "DEVOTION"

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For Your Requirement Of :

ACETONE / IPA / MEK /
MIBK / IBA / NBA / ISO AA (Recovered)
XYLENE / BENZENE / TOLUENE / METHANOL / HEXENE (Recovered)
LDC / TCE / CTC / MDC / MEG / DEG (Recovered)
METHYL ACETATE / ETHYL ACETATE / ETHYL ACETONE /
ISO-PROPYL ACETATE
DOP / DIOP / DBP / PARAFORMALDEHYDE 91%.

We also buy spent solvent and waste solvents.
We also undertake distillation job work.

Please Contact Mfr. :

M/s. SHREE CHEM INDUSTRIES

2/4, Kubal Nivas, Gokhale Road (N).
Dadar, Bombay-400 028.
Telephone : 456868

Meta Cresol	46.00
Nitrobenzene	18.00
Nitric Acid (Con.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol (Resale)	35.00
Propylene Glycol	41+ST
Polyethylene Glycol (No. 200)	39.00
Polyethylene Glycol (No. 400)	42.00
Polyethylene Glycol (No. 500)	42.00
Polyethylene Glycol (No. 1600)	14.00
Polyethyene Glycol (No. 4000)	38.00
Polyethylene Glycol (6000)	50.00
Para Cresol	40.00
Styrene monomer	50+ST
Sorbitol	16.00
Sulphuric Acid	2.10
Trichloroethylene	28.00
Triethanolamine (Resale)	49.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	11.75
Triethylamine	50.00
Vinyl Acetate Monomer	43.30

SOLVENTS	Per Litre
Benzene	15.00
N-Heptane	8.00
N-Hexane	8.75
Methanol	8.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	19.00
Xylene	17.00

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)	
Alphanaphthylamine	60.00
Alpha Naphthol (Imp.)	180.00
Aceto Acetic Ester (Methyl)	60.00
Ammonium Molybdate	200.00
Anthraquinone	100.00
Anthranilic Acid	60.00
2-Amino-4-Nitrophenol (Imp.)	155.00
Blue B. Base (Local)	230.00
Beta Naphthol (Atul)	58.00
Benzidine Dihydrochloride (BDH)	80.00
Bromamine Acid	400.00
BON Acid	117.00
Chicago Acid	280.00
Coach Acid	56.00
C. Acid (Imp.)	260.00
Cyanuric Chloride (Japan)	120.00
2, 4, DNCB	29.00
Dihydrothio PTOS (Imp.)	600.00
Dimethyl Aniline	69.00
Diethyl Aniline	160.00
Di-amino stilbene disulphonic acid	125.00
3, 3-DCB (Imp.)	180.00
Gamma Acid (Atul)	170.00
H. Acid (Atul)	155.00
G. Salt	60.00
Isophthalic Acid	45.00
J. Acid	265.00
J. Acid Urea	280.00
K. Acid	105.00
MDPS (German)	200.00
MNA	90.00
Meta Unido Aniline	155.
MPD (Local)	140+EX+
MPD (Japan)	210.0
Naphthenic Acid	12.0
N-Methyl J. Acid	380.0
N-Methyl Aniline	120.0
Naphthalene (Refined)	23.0
Ortho Anisidine (OA Imp.)	85.0
Ortho Dichloro Benzene (ODCB)	11.2
OT Base	100.0
Para Dichloro Benzene (PDCB)	17.0
Para Anisidine (PA-Imp.)	110.0
Para Anisidine (PA-Local)	90.0
PNA	70.0
Para Cresidine (Imp.)	335.0
Para Amino Azo Benzene (India)	125.0
PNCB	34.
Para Amino Acetanilide	145.0
1-Phenyl 3-methyl-5 Pyrazolone	120.
Phenyl J. Acid	345.
Para Amino Benzoic Acid	170.0
PT Base	88.
Rhoduline Acid	500.
Resist Salt	22.
Resorcinol	145.
Sodium Naphthionate	65.
5-Sulpho-Anthranilic Acid	64.
Sulphanilic Acid	25.
Sulpho Tobias Acid	115.
Trichloro Benzene (TCB)	17.
Tobias Acid	125.

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When it comes to chemicals, we care little extra. Making sure to produce chemicals that meet exacting standards of quality, purity and reliability. Backed by research and thorough testing. Our customer service can help you improve your present products and develop new ones. And remember, we can meet your requirement in bulk, whenever and wherever you want. why not try ?

We manufacture: N.T.A. • E.D.T.A. salt • S.M.C.A. • Sodium Acetate & Hydrochloric Acid.

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Regd Office: 408 Sharada Chambers,
33 New Marine Lines, Bombay 400 020.
Phones: 252236-252256 • Telex: 011-
Factory: [illegible]

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TRI ETHYL AMINE
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ETHYL CELLOSOLVE
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HYDROGEN PEROXIDE 50%
GLYOXAL 40% * E.D.C.
PYRIDINE 2° (Original)

OXALIC ACID 98% & 92%
OXALIC ACID (Substitute)
TARTARIC ACID (Substitute)
PHTHALIC ANHYDRIDE
PARA FORMALDEHYDE 91%
TRICHLORO ETHYLENE (Tech.)
METHYLENE CHLORIDE 99%
I.P.A. (Original & Distilled)
ACETONE (Original & Distilled)
THIONYL CHLORIDE

Kindly Contact :

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M-1 Faiz-E-Qutbi, 375, Narsinatha Street, P.O. Box No. 5212,
BOMBAY-400 009.
Phone : Office : 349080,345011,322958,348475 Resi. : 5121572,5124452

For Your Regular Requirements Of :

AMMONIUM BICARBONATE (MANGALA)
BLEACHING POWDER (MODI & METTUR)
SULPHATE OF ALUMINA (AAC)
CAUSTIC SODA FLAKES & SOLID
SODIUM THIOSULPHATE (HYPO)
SODIUM BISULPHITE & SULPHITE
SODIUM NITRITE & NITRATE
SODIUM METASILICATE (KAILASH)
SODIUM SULPHIDE FLAKE & CHIPS
SODIUM SULPHATE (GOLDEN)
SODIUM ACETATE (CAP)
SODIUM FORMATE (KUMAR)

OXALIC ACID (EXCEL & KUMAR)
TRISODIUM PHOSPHATE (IRE)
BORIC ACID POWDER
SODA ASH & R. B.
CITRIC ACID (COMMERCIAL & CITURGIA)
ACETIC ACID (TDC)
DI-AMMONIUM PHOSPHATE
TITANIUM DIOXIDE
HYDRO SULPHITE OF SODA
SOLVENT DEG.
BORAX (GRANULAR & CRYSTALS)
AND ALL INDL. CHEMICALS.

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M/s. MADANRAJ KHICHA

(ESTD. 1963)
No. 86, Govindappa Naick Street,
MADRAS-600 001.
Gram : SESHMADAN Phones Office : 561850/563381 Resi. : 518263/515106.

Bombay dyes market

(Prices as on 26th July 1988)

ACID COLOUR	Per Kg.
Acid Violet 4BS	143.00
Acid Maroon V	110.00
Acid Orange II	77.80
Acid Orange IIY	65.05
Acid Red A	107.25
Crosein Scarlet MOO	155.00
Acid Scarlet 3R	96.90
Acid Red 3BN	125.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Green V	230.00
Acid Patent Blue AS	250.00
Acid Coomasi Blue	200.00
Acid Yellow 3GN	65.00
Acid Red FG	65.00
Acid Red GRS	78.00
Acid Black 10 BX	121.95
Acid Black BX	98.40
Acid Black Wax	135.50
Procinil Yellow GS (ICI, UK)	285.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	800.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	350.00

DIRECT COLOURS	Per Kg.
Yellow 3GX	88.10
Gun Yellow RCH	134.00
Fast Yellow GCH	141.15
Yellow CFG Hly. Conc.	312.00
Fast Yellow GS	111.85
Fast Yellow CHRS	95.45
Viscose Orange A	166.15
Fast Orange GR	133.75
Red	96.90
Dark Tan	78.25
Red 2R	72.55
Red 4B	168.10
Bordeaux BW	132.30
Fast Scarlet 4BS	166.55
Red 12B	176.55
Bordeaux Hly. Conc.	184.00
Cotton Red N	117.85
Brill. Fast Helio B	275.00
Brill. Fast Helio 2B	297.00
Brill. Fast Helio 2RS	136.20
Brill. Fast Helio BS	116.20
Brill. Violet Extra	126.40
Blue 2B	86.60
Blue G	170.50
Sky Blue FB	188.25
Copper Blue GR	147.00
Fast Greenish Blue GL	114.60
Developed Black BT	116.10
Blue NB-2B	300.20
Blue NB-2BC	185.30
Developed Black NB-GHB	185.30
Green B	111.65
Green NB-B	168.25
Green 2B-N	188.25
Brown MR	154.40
Brown CN	107.25
Golden Brown G	140.35
Catechin G	120.50
Omega Tan	126.40
Catechin GS	102.80
Black E Hly Conc.	142.60
Black E Extra Hly. Conc.	142.60
Black NB-ER Hly. Conc.	310.50

DISPERSOL COLOURS	Per Kg.
Yellow 6G Powder	143.80
Red 3 3B Powder	247.80
Red B 2B Powder	323.20
Red CS Powder	439.15
Red DHB Powder	477.40
Violet C 4R	521.90
Blue BG Powder	235.45
Blue BN Powder	103.75
Blue D 2R Powder	476.25
Navy BT Powder	243.90
Blue B 3G Powder	210.20
Black BT Powder	182.60
Blue BR Powder	390.20
Yellow 7GL	338.60
Yellow 5RX	218.80
Yellow 3G	367.25
Yellow	140.00
Yellow AL	135.30
Yellow Brown REL	247.50
Yellow FFL	463.60
Gold Yellow GG	258.70
Pink REL	247.00
Red REL	468.65
Red 2B	327.40
Red FB	324.20
Red Violet FBL	469.85
Orange 3R	196.65
Violet 2R	280.00
Violet RL	275.45
Violet 6B	685.75

Scarlet RR
Rubine 3B
Rubine CB
Blue GL
Blue BGF
Navy Blue RF
Brown 3REL
Black GEL
Dark Brown 3B

BASE COLOURS
Fast Yellow GC
Fast Orange GC
Fast Scarlet R
Fast Scarlet RC
Fast Scarlet RCR
Fast Scarlet G
Fast Scarlet GN
Fast Scarlet GG
Fast Scarlet GGS
Fast Red B
Fast Red RC
Fast Red R Flakes
Fast Red TR
Fast Red TR Oil
Fast Red RL
Fast Red KB Oil
Fast Bordeaux GP
Fast Garnet GBC
Fast Violet B
Fast Blue BB

NAPHTHOL COLOURS
ASG
AS
ASSW
ABBS
ASBO
ASD
ASOL
ASTR
ASPH
ASE
ASEI
ASLB
ASBT
ASWG
ASSG
ASSR

LOURS	Per Kg.
HR	181.80
H4G	117.85
H-8GP	168.55
HE6G	166.95
R	276.05
H7G	332.30
	243.95
R	326.05
M4G	177.10
M8G	332.30
R	217.60
H 2R	241.85
7B	157.95
M 2R	313.15
8B	169.45
H RN	245.05
H-3BP	179.30
-F3B	243.45
ta HB	167.00
5P	98.90
8B	173.70
MB	137.10
ta MB	121.55
H-3R	180.20
H-7R	175.40
H 3R	298.50
H-GR	866.55
5G	173.10
	283.85
H 7G	178.70
7RX	358.15
A	234.45
H-3RP	335.70
quoise H 2GP	181.50
D	305.80
H ER	258.80
X	389.30
Navy Blue M 3R	310.95
Brill. Blue MR	331.70
Brill Blue M RX	214.20
Brill. Blue M-G	382.30
Blue M 4GD	344.60
Navy Blue M RB	318.75
Turquoise M-G	197.85
Brill. Blue M GX	302.50
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide (per kg.)	285.00
Green H 4BD	269.80
Green H-E4BI	169.20
Red Brown H IF	143.25
Orange Brown H 2R	209.05
Brown M GRN	188.80
Black H-N	283.35

SULFUR COLOURS	Per Kg.
Navy Blue	99.85
Green G	198.55
Black Grains Extra	63.05
Black Grains OG	64.55
Black GXE Conc.	61.60
Black GXE	52.75
Black GXR	61.60
Black Grains 800	54.20
Black EXR Grains	64.55
Black EXR Grains 800	51.25

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Powder Fine	673.15
Yellow 5G Supra Disperse	439.30
Yellow 5G Acra Con.	628.75
Yellow 3R Powder	588.85
Gold Orange 3G Pdr. Fine	952.15
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp.	601.30
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	997.80
Brill. Red 3B Supra Disp.	713.20
Brill. Purple 4R Conc. Pdr.	470.75
Brill. Purple 3R Acra Powder	690.85
Brill. Purple 2R Hly Conc.	597.90
Brill. Purple 4R Supra Disp.	500.05
Brill. Purple 2R Acra Conc.	625.95
Blue R Powder Fine	542.15
Blue BC Conc. Pdr. Fine	522.50
Blue BC Acra Conc. Pdr. Fine	762.70
Blue R Conc. Pdr. Fine	877.88
Blue RR Supra Powder	629.30
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Brill. Blue 2R Supra Disp.	115.85
Dark Blue 2R Powder Fine	389.25
Blue BC Supra Disp.	358.40
Jade Green XBN Powder Fine	438.20
Jade Green XBN Acra Conc. Powder	623.90
Jade Green 2G Pdr. Fine	419.65
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	496.00
Olive Green B Pdr. Fine	399.90
Olive D Pdr. Fine	444.30
Olive Green B Supra Disp.	308.25
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Pdr. Fine	698.85
Olive OMW Supra Disp.	530.05
Olive R. Pdr. Fine	422.95
Olive D Supra Disp.	361.70
Olive R Supra Disp.	363.90
Olive D. Ptg. Paste	193.00
Olive Green B. Ptg. Paste	199.10
Olive Green B Acra Conc.	542.75
Olive R Acra Conc.	640.00
Olive Green B Acra Conc.	542.75
Brown R Pdr. Fine	835.00
Brown G. Pdr. Fine	795.00
Brown R Pdr. Fine	659.75
Dark Brown 3R Pdr Fine	685.00
Brown G. Supra Disp.	449.90
Brown 2G Supra Disp.	354.00
Brown R Supra Disp.	422.95
Brown BR Powder	719.00
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	414.55
Brown G Acra Conc.	733.95
Brown R Acra Conc.	766.00
Grey M. Powder Fine	768.80
Grey M. Supra Disp.	586.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	330.35
Direct Black AC Pdr. Fine	474.70
Direct Black CH Supra Disp	393.20
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI JULY 29, (NNS) — Titanium dioxide Anatase went up sharply by 6.50 per kg in the Delhi chemicals market during last week on heavy mutual speculation among distributors and traders, says NNS. Mercury, however slipped by Rs. 250 per flask on slack offtake. Sodium nitrite and tartaric acid also declined by Rs. 25 each. Business was good.

Titanium dioxide jumped up from Rs. 52.50 to Rs. 59.00 per kg. on reports of heavy mutual speculation among traders and distributors caused by rumour of sharp increase in the prices of titanium by manufacturers. Titanium dioxide RC-22 moved up by Rs. 3 at Rs. 74, while offtake was poor by actual users and consumers.

Chatkolite (China) hardened by Rs. 2.50 at Rs. 50.50 on good stockists demand. Rangolite ruled quiet at Rs. 70. Sodium hydro sulphite Damosha and Tamilnadu looked up by Re. one at Rs. 41.50 and Rs. 42 on acute shortage of goods. Kalali hydro, however, was offered lower at Rs. 43 against Rs. 45.

Glycerine hardened by Rs. 3 at Rs. 47/48 per kg. on tight supply. Camphor thai looked up by Rs. 2 at 100 on good seasonal demand for ensuing festivals. Camphor powder ruled quiet at Rs. 87 on satisfactory supply.

Hydrogen peroxide lost Rs. 2/3 at Rs. 27/29 on increased supply of imported and indigenous goods. Caustic soda flakes declined by Rs. 4/5 at Rs. 400/405 on improved offerings by manufacturers. Sodium nitrite and tartaric acid suffered a setback of Rs 25 each at Rs. 675/700 and Rs. 6025 on poor demand due to rainy weather. Sodium nitrate also softened by Rs. 10.

Mercury however, suffered a fall of Rs. 250 at Rs. 11,250 per flask on profit taking selling by stockists. Menthol flake, medium and bold advanced by Rs. 2/5 at Rs. 200, Rs. 217 and Rs. 227 per kg. respectively, because of fall in arrivals from Rampur, Sambalpur and Moradabad areas of U.P. Export demand was also good. Citric acid marked up by Rs. 25/60 at Rs. 2000/2400 in the absence of arrivals of imported and indigenous goods.

Soda bicarb edged up by Rs. 5 at Rs. 165/175 on poor supply and good demand. Ammonia bicarb softened at Rs. 140 (per 25 kg.) on persistent offerings. Paraffin wax moved up by Rs. 5 at Rs. 630 on reduced arrivals from Assam. No change was reported in dyes and Colours.

(DELHI MARKET RATES AS ON JULY 29, 1988)

Ammonia Bicarb (per 25 kg)	140.00
Mercury (per flask)	11,250.00
Soda ash (per bag)	270-300.00
Ammonium chloride (per 50 kg)	125-180.00
Caustic soda solid	**No Stock**
Caustic soda flakes (per 50 kg)	400-405.00
Citric acid (per 50 kg)	2000-2400.00
Stable Bleaching Powder Shriram (per 25 kg)	95.00
Stable Bleaching Powder KCI (per 25 kg)	88.00
Stable Bleaching Powder MODI (per 25 kg)	90.00
Sod. Bicarbonate (per 50 kg)	265-275.00
Sod. Hydro Sulphite (per kg)	43.00
[illegible]	[illegible]

Boric acid Technical (per 50 kg)	1015.00
Paraffin wax (per 50 kg)	630.00
Tartaric acid (per 50 kg)	6,025.00
Borax Granular (per 50 kg)	550.00
Borax Crystal (per 50 kg)	575.00
Sodium Nitrate (per 50 kg)	430.00
Sodium Nitrite (per 50 kg)	675-700.00
Camphor Powder (per kg)	87.00
Camphor Thai (per kg)	100.00
Menthol Medium (per kg)	217.00
Menthol Flakes (per kg)	200.00
Menthol Bold (per kg)	227.00
Glycerine (per kg)	47-48.00
Sodium Silicate (per quintal)	200-250.00
Hexamine (per kg)	42.00
Acetic Acid Glacial (per kg)	13-13.50
Copper Sulphate (per quintal)	2100-2300.00

Formic acid (per kg
Formaldehyde (per k
Hydrogen Peroxide (per kg)
Calcium Carbonate (per tonne)
Acid Slurry Soft (per
Acid Slurry Hard (pe
Phosphoric Acid (per
Pot. Nitrate (per quint
Pot. Permanganate (per 50 kg)
Sod. Bichromate (per 50 kg)
Tri-Sod. Phosphate (per 50 kg)
Titanium Dioxide An (per kg)
Titanium RC-822 (per
Zinc Oxide (per mt) 3
Phenol Carbolic Acid (per kg)
Carbon Tetrachloride
Chloroform (per kg)
Sodium Sulphate (per 50 kg)
Naphthalene Balls (per

DYES & COLOURS

Naphthol AS
Naphthol ASG
Naphthol ASBS
Naphthol ASTR
Naphthol ASOL
Naphthol ASBO

DIRECT DYES

Black E. Conc.
Diazo Black B.T.
Green B
Blue 2-B
Sky Blue FB
Basic Auramine
Basic Rhodamine
Basic Methylene Blu
Basic Violet
Basic Malachite Gree
Acid Orange

Madras Market

s moderate activity dur- Hydros, DEG, sodium maintained previous levels rrivals and good enqui- ing industries have been due to poor supplies of s likely Nitric Acid 98%, Toluene, Benzene, Xylene, etc, which were under acute short supply. Mettur Chemicals commenced production of perchloroethylene and the material was available in 300/320 kgs. packing at Rs. 24.50 per kg.

ADRAS MARKET RATES AS ON JULY 30, 1988)

— Glacial	18.00
Soft) (per kg)	27.00
ulphate Iron free	1,900.00
Bi-carbonate g)	125.00
Chloride SPIC e)	2,200.00
owder — Mettur bags)	120.00
lar (per 50 kg)	650.00
id 98/99%	86 + E.D.
40/42%	39.00 + E.D.
8% (per ton)	62 + E.D.
F[illegible] Mettur)	8 600 00
le Flakes Sugar)	2 600.00
— Indian	48.00
onate kg)	1000.00
d (India) (per kg)	28.00
le (per kg	[illegible]
per kg	45.00
Hydrosulphite of Soda TCP (per kg)	42.00
Hydrosulphite of Soda ID (per kg)	45.00
Hydrosulphite of Soda BASF (per kg)	48.00
Hydrogen Peroxide (India) (per kg)	30.00
Hyflo Supercell	19.50
Magnesium Carbonate Light	18.50
Potassium Bichromate (per kg)	27.00
Phosphoric Acid (per kg)	20.00
Phthalic Anhydride (per kg)	22.00
Paraffin Wax (per kg)	14.00
Oxalic Acid (per kg)	20.00
Soda Ash (TAC (per 75 kg)	320.00
Soda Ash (TATA) (per 75 kg)	320.00
Sodium Cyanide Indian (per kg)	56.00
Sodium Cyanide Degussa (per kg)	85.00
Sodium Bichromate (per kg)	20.00
Sodium Bicarbonate (per 50 kg	280.00
Sodium Nitrite (per 50 kg)	750.00
Sodium Nitrate (per 50 kg)	450.00
Sodium Silicate (per tonne)	4600 00
Sodium Sulphate (per tonne)	3600 00
Sodium Sulphide Flakes (per tonne)	13.500 00
Sodium Bi-sulphite (Aswin) (per MT)	3,800.00
Stearic Acid (per kg)	35.00
Trisodium phosphate (per 50 kg)	410.00
Titanium Di-oxide Indian TTP (per kg)	48.00
Titanium Di-oxide Indian Rutile (per kg)	58.00
Urea Tech (per tonne)	2,800.00
Zinc Oxide (per kg.)	34.00
Zinc Chloride Powder (per kg.)	13.00
Zinc Sulphate (per tonne)	4,500.00
Di-octyl phthalate (per kg)	40.00
Di-butyl phthalate (per kg)	40.00
Hexamine (per kg)	32.00

SOLVENTS

Acetone (IOC) (per kg)	19.00
Isopropyl Alcohol NOCIL (per kg)	23.00
Diacetone Alcohol NOCIL (per kg)	29.00
Benzene SAIL (per kg)	17.00
Diethylene Glycol NOCIL (per kg)	45.00
Butanol NOCIL (per kg)	34.00
Toluene SAIL (per litre)	14.00
Xylene IPCL (per litre)	16.00
Phenol HOC (per kg)	28.00
Turpentine (per litre)	16.00
Sorbitol (per kg)	35.00
Trichloroethylene MCIC (per kg)	23.50
Carbon Tetra Chloride (per kg)	16.00
Chloroform (per kg)	25.00
Methylene chloride (per kg.)	24.00
Methyl Ethyl Ketone (per kg)	53.00
Cellosolve (per kg)	51.00
Triethanolamine (per kg	[illegible]
Ethyl Acetate (per kg)	23.00
Butyl Acetate (per kg)	40.00
Methanol (per litre)	[illegible]

MATERIALS IMPORTED

MADRAS

(From 16.2.88 to 29.2.88)

ACETIC ANHYDRIDE: From Singapore: Madras Marine Pvt. Ltd., 14.4 Mts., Rs. 1,92,120.

ACETYL SULPHONYL CHLORIDE: From Japan: Benze Labs. Ltd., 17,000 kgs., Rs. 5,73,291; Vikas Laboratories, 8.5 Mts., Rs. 3,03,507.

ACRYLIC MONOMER: From USA: Anabond Pvt. Ltd., 480 lbs., Rs. 27,391.

ALDEHYDE C 11, C-10: From FRG: S. S. Products, 100 kgs., Rs. 21,839.

D-ALLETHRIN: From Japan: Semio Chemicals P. Ltd. 24.50 kgs., Rs. 36,794.

ALLYL CHLORIDE: From Japan: Govdow Chemicals & Pharmaceuticals, 5,040 kgs., Rs. 1,12,232.

ALPHA NAPHTHOL: From Japan: IEL Ltd., 2,000 kgs., Rs. 1,99,599.

ALUMINA: From Singapore: Widia India Ltd. 212 Mts., Rs. 38,114.

AMINE CATALYST: From Singapore: Cauvery Papers Ltd., 50 kgs., Rs. 7,936.

AMMONIUM PERSULPHATE: From Japan: IEL Ltd., 7,000 kgs., Rs. 1,19,835.

AROMATIC CHEMICALS: From France: B.V. Aswathiah & Bros., 250 kgs., Rs. 38,820; From Japan: Bush Boake Allen (I) Ltd., 330 kgs., Rs. 1,02,326; From Switzerland: Karnataka Soaps & Detergents, 2,800 kgs., Rs. 2,88,923; From UK: Bush Boake Allen (I) Ltd., 1,475 kgs., Rs. 3,75,063.

BISPHENOL A: From France: SIP Resins Ltd., 75,000 kgs., Rs. 12,15,851.

BORON CARBIDE POWDER: From FRG: President of India, 7 kgs., Rs. 14,547.

BUTACHLOR TECHNICAL. From USA: Tropical Agrosystem Pvt. Ltd., 69,840 Lbs., Rs. 12,31,834.

BUTANE DIOL: From FRG: Vikram Sarabhai Space Centre, 260 kgs., Rs. 12,847.

BUTYL CARBITOL: From Australia: Kooverji Devshi & Co. P. Ltd., 2,185.20 kgs., Rs. 2,63,245.

N-BUTYRIC ACID: From FRG. Bush Boake Allen (I) Ltd., 5,000 kgs., Rs. 1,19,749.

CALCIUM OXIDE POWDER: From UK: Fenner (India) Ltd., 2,000 kgs., Rs. 26,899.

CALCIUM SILICATE: From USA: Escorts Ltd., 23,460 kgs., Rs. 8,40,736.

CAPROIC ACID TECHNICAL: From FRG: Bush Boake Allen Ltd., 330 kgs., Rs. 29,259.

CAPROLACTAM: From Spain. Shriram Fibres Ltd., 486 Mts., Rs. 1,13,94,876.

CARBON BLACK: From Japan: M. R. Electronic Components Ltd., 113 kgs., Rs. 21,368.

CASSIA OIL: From FRG: Bush Boake Allen (I) Ltd., 100 kgs., Rs. 18,735.

CELLULOSE ACETATE: From FRG: Kothari Electronics & Ind. Ltd., 600 kgs., Rs. 1,78,475; From Switzerland: Associated Paint Inds., 425 kgs., Rs. 40,336

CHOLESTEROL: From Japan: Datpro International, 350 kgs., Rs. 1,78,756.

COUMARIN: From France: Mysore State Agarbathies Mfg. Co-op. Soc. Ltd., 1,000 kgs., Rs 1,93,347.

CYCLOHEXANONE: From Si gapore: Prakash Pipes and Ind Ltd., 3,040 kgs., Rs. 71,361.

DESMODUR FS: From FRG DP Foam Pvt. Ltd., 60 kgs., Rs 8,131.

DESMODUR T 80: From Bel gium: Joy Foam P. Ltd., 6,25 kgs., Rs. 1,77,707.

DESMOPHEN: From Belgium Joy Foam P. Ltd., 10,105 kgs Rs. 1,24,281.

DIACETYL METHYL COUMA RIN: From UK: Robin Chemical Pvt. Ltd., 85 kgs., Rs. 19,561.

DIETHYL ANILINE: From US Siris India Ltd., 13,880 kgs., R 3,70,823.

DIGLYME: From Japan: TF Laboratories P. Ltd., 585 kg Rs. 30,679.

DIMETHYL SULPHOXID From France: Savera Laborato es P. Ltd., 7.980 kgs., R 1,70,764 From Japan: Plant ganics Ltd., 220 kgs., Rs. 1,2 882; Savera Laboratories Lt 7,920 kgs., Rs. 1,73,281.

DIPHENYL PYRALINE· Fr USA: Eskays Ltd., 33 kgs., 70,466.

LEMON OIL: From Belgiu Kissan Products, 40 kgs., 1,07,417.

ETHANOL SOLUTION: Fr USA: Bharat Heavy Electric Ltd., 2 lbs., Rs. 979.

ETHYL CYANOACETA From Japan: Standard Resea Centre, 200 kgs., Rs. 49.283

ETHYLENE GLYCOL: Fr FRG: Electronics Corpn. of Ta Nadu, 1,760 kgs., Rs. 32,469

EUGENOL: From Singa Karnataka Soaps and Deterg 125 kgs., Rs. 15.829.

FLUORO CARBON RE From Japan: Flucro Plast, kgs., Rs. 59,658; From U Xomox India Ltd., 50 kgs., 33,463.

MIC AC:D: From FRG: a Leathers, 20,160 kgs., 54,259.

FURYL ALCOHOL: From n: Coromandel Prodorite ,000 kgs., Rs. 1,32,285.

MMA FERRIC OXIDE: From pore: Prakash Pipes & Inds. 12,000 kgs., Rs. 10,72,283.

APHITE POWDER: From : Indo National Ltd., 100 Rs. 15,663.

M ROSIN: From Singapore: h Trading Co., 4.840 Mts., 0,758; From Hong Kong: avathi Sri Venkatesa Paper Ltd., 18 Mts., Rs. 1,26,266; al Papers Ltd., 18 Mts., Rs. 396; T. T. Cardboards and Mills Ltd., 18 Mts., Rs. 478; From Indonesia: Cau- Papers Ltd., 18 Mts., Rs. 064; M. Gopalakrishnan & 8.160 Mts., Rs. 56,934; akshmi Tdg. Co., 18 Mts., ,23,464.

JM ROSIN IS GRADE: From nesia: South India Paper Ltd., 18 Mts., Rs. 1,21,576; l Nadu Newsprint & Paper 36 Mts., Rs. 2,45,700.

JM ROSIN WW GRADE: Singapore: Adhesives & nicals, 1 Mt, Rs. 75,441.

ELIOTROPIN: From Japan: ica Chemical Products, 210 Rs. 62,641.

YDROGEN CHLORIDE: From Indian Explosives Ltd., 1,503 Rs. 52,881.

DROGEN PEROXIDE 50%: Spain: Polychem Products, 0 kgs., Rs. 53,796; Polymer micals, 11,000 kgs., Rs. 09.

YDROQUINONE: From Ja- N. Patwari Traders Pvt. Ltd., 00 kgs., Rs. 6,87,004.

YDROXYLAMINE SULPHA- From FRG: Vogel Laborato- P. Ltd., 18 Mts., Rs. 4,85,- From Netherlands: Standard Organics Ltd., 40 Mts., Rs. 10,98,548.

IODINE CRUDE: From Japan: Eskayef Ltd., 3,000 kgs., Rs. 7,04,182.

ISOBORNYL CYCLOHEXANOL: From France: Mysore State Agarbathies, 3,000 kgs., Rs. 4,48,598; From FRG: Hill Top Inds., 600 kgs., Rs. 92,599.

ISOBUTYL BENZENE PURE: From USA: Chandra Pharmaceuticals Ltd., 12.606 Mts., Rs. 4,22,616; Cheminor Drugs Pvt. Ltd., 40,971 kgs., Rs. 15,30,305.

ISOBUTYRALDEHYDE: From FRG: Indian Drugs & Pharmaceuticals Ltd., 13,950 kgs., Rs. 1,94,154.

ISOPHTHALIC ACID: From Japan: Synthetic Resin Products, 2,500 kgs., Rs. 36,638.

ISOPROPYL ALCOHOL: From Australia: Widia India Ltd., 12.792 Mts., Rs. 1,00,204.

LACTOSE: From Netherlands: Lal Chand Bhimraj, 4,000 kgs., Rs. 46,746.

LAURYL PEROXIDE: From FRG: DCW Ltd., 3.75 Mts., Rs. 3,09,795.

LEMON OIL: From Belgium: Kissan Products, 40 kgs., Rs. 1,07,417.

LEVAMISOLE HCL: From FRG: Alved Products, 200 kgs., Rs. 1,46,907.

LINALYL ACETATE: From FRG: N. Ranga Rao & Sons, 225 kgs., Rs. 35,969.

LITHIUM CARBONATE USP: From Yugoslavia: Micro Labs. Pvt. Ltd., 1,000 kgs., Rs. 1,10,238.

LITHOPONE: From FRG: Carborundum Universal Ltd., 6,000 kgs., Rs. 83,953.

L-LYSINE MONO HCL: From Korea: K.R.V. Agencies, 1,000 kgs., Rs. 36,962.

METHOCEL: From U.S.A.: Astra IDL Ltd, 90.72 kgs., Rs. 24,641.

METHOCEL CELLULOSE POWDER: From Singapore: Astra IDL Ltd., 317.52 kgs., Rs. 73,641.

METHYL ETHYL KETONE: From Netherlands: Indian Dyestuff Inds. Ltd., 19.8 Mts., Rs. 1,86,171; From Singapore: Indian Dyestuff Inds. Ltd., 6,600 kgs., Rs. 62,057; From U.K.: Shardlow India Ltd., 165 kgs., Rs. Rs. 1,21,547.

METHYL HEPTINE CARBAMATE: From Switzerland: Aromatic India, 11 kgs., Rs. 23,650.

MOLYBDIC OXIDE: From USA: Visveswaraiah Iron & Steel Ltd., 16,000 kgs., Rs. 62,354.

ORTHO XYLENE: From Netherlands: Ambuja Petrochemicals P. Ltd., 1979.694 Mts., Rs. 84,72,682.

D-PARA HYDROXY PHENYL GLYCINE: From Japan: TTK Chemicals Ltd., 1.000 kgs., Rs. 2,33,444.

PATCHOULI OIL: From Indonesia: Gopika Perfumery Works, 200 kgs., Rs. 20,631 From Singapore: Karnataka Soaps and Detergents, 2,000 kgs., Rs. 2,78,589.

PHENOL: From Japan: Indian Systans P. Ltd., 31,200 kgs., Rs. 3,92,496.

PHOSPHORIC ACID: From Tunisia: Madras Fertilizers Ltd., 5,484.247 Mts., Rs. 2,74,01,796.

PIPERIDINE: From Japan: Standard Research Centre, 170 kgs., Rs. 23,150.

PIPERIDINOETHANOL: From Japan: Servicare Labs P. Ltd., 1,020 kgs., Rs. 2,30,380.

POLYBUTYL CUPRYSIL PASTE: From FRG: B.H.E.L., 37 kgs., Rs. 13,468.

POTASSIUM LIQUID: From U.S.A.: Anabond Pvt. Ltd., 4.862 kgs., Rs. 16,64,948

PROPYLENE GLYCOL· From Singapore: Naphtha Resins & Chemicals Pvt. Ltd., 17,200 kgs., Rs. 1,78,455; Rasiklal and Sons, 25,155 kgs., Rs. 2,87,088; From U.S.A. : I.T.C. Ltd , 34,400 kgs., Rs. 3,68,063.

PROPYLENE GLYCOL USP · From Singapore· Rasiklal and Sons, 8,385 kgs., Rs. 95,696.

PROTEASE: From Denmark: Biocon India P. Ltd., 150 kgs., Rs. 54,275.

PROTEIN BINDER: From Spain: Polar Chemicals Co., 1,335 kgs., Rs. 24,601.

SILICONE OIL: From FRG: Kothari Electronics & Inds., 25 kgs., Rs. 12,390; From Japan: Electronics Corpn. of Tamilnadu, 36 kgs., Rs. 11,743.

SILICONE STABILISERS: From Singapore: Cauvery Papers Ltd., 700 kgs., Rs. 39,312.

SODIUM ARSENITE SOLN.: From U.S.A.: Coromandal Fertilizers Ltd., 666 kgs., Rs. 30,457.

SODIUM BROMIDE: From Switzerland: Interchem Pvt. Ltd., 5 kgs., Rs. 639.

SODIUM TRIPOLYPHOSPHATE: From Malaysia: Fashion Elastics, 16 Nos., Rs. 14,640.

STANNOUS OCTOATE: From Singapore: Cauvery Papers Ltd., 100 kgs., Rs. 19,778.

STELLITE POWDER: From Japan: B.H.E.L., 0.250 Mts., Rs. 1,40,530.

STYRENE OXIDE: From Japan: I.E.L. Ltd., 3,600 kgs., Rs. Rs. 1,46,603

SURFACE REAGENTS: From Japan: indo National Ltd., 180 kgs., Rs. 14,560.

SYNTHETIC RESIN. From USA: MRF Ltd., 1,111 kgs., Rs. 41,052; Shree Tirupathi Plastics, 39.998 Mts., Rs. 3,85,305.

TERTIARY BUTYL ALCOHOL: From Japan: Aswathi Chemicals (P) Ltd., 6,200 Mts., Rs. 1,17,201.

TERTIARY BUTYL META XYLENE: From FRG: Maschmeijer Aromatics Ltd., 14,040 kgs., Rs. 4,82,528.

TETRADIFON TECHNICAL : From France: Sri Ramesh Enterprises, 3,000 kgs., Rs. 5,77,822.

TETRAHYDROFURAN: From Singapore: Prakash Pipes and Inds. Ltd., 10,160 kgs., Rs. 2,00,297.

THICKAL LIQUID POLYSULPHIDE: From UK: Carborundum Universal Ltd., 4.54 kgs., Rs. 2,119.

TITANIUM CARBIDE: From Japan: Triton Laboratories Ltd., 150 kgs., Rs. 36,962.

TITANIUM DIOXIDE: From Belgium: Widia (India) Ltd., 2,000 kgs., Rs. 62,122.

TITANIUM DIOXIDE RUTILE: From Japan: Addison Paints & Chemicals, 17,500 kgs., Rs. 4,76,531.

TITANIUM TETRACHLORIDE From FRG: Widia India Ltd., 34 kgs., Rs. 8,249.

TRICHLOROETHYLENE. Fro UK: Hindustan Aeronautics Ltd 354 kgs., Rs. 11.391.

TRIFLUROFERAZINE HCL: Fro Hungary: Micro Labs. P. Ltd., 2 kgs., Rs. 45,103.

3,4,5 TRIMETHOXY BENZAL DEHYDE: From France: Coast Pharma Chemicals, 1,000 kgs Rs. 2,98,209; Savera Laborat ries Pvt. Ltd., 3,000 kgs., R 8,89,110; From UK: Mohan Br thers P. Ltd., 3,000 kgs., R 8,69,110.

TRIPHENYL PHOSPHAT From FRG: Mysore Acetate Chemicals Co., 16.8 Mts., R 6,42,664.

UROKINASE: From DPK: T Chemicals Ltd., 320 Mts., 55,670.

VANILLIN: From France: M sore State Agarbathis Mfg. op. Society Ltd., 5,000 kgs., 8,12,084.

ZINC DICYANAMIDE: Fr UK: I E L Ltd., 1,972.06 kgs., 2,77,408.

Plastic Materials Imported

MADRAS

(From 6.2.88 to 29.2.88)

HDPE: From Japan: Gee Bee Poly Inds., 20,264 kgs., Rs. 2,41,315; Kamalavel Corpn., 50,000 kgs., Rs. 6,22,516; Maris Polysacks Pvt. Ltd., 50,000 kgs., Rs. 6,19,654; Safe Pack Polymers Ltd., 80 Mts., Rs. 13,19,807; Sri Rama Poly Bags, 20 Mts., Rs. 2,40,004 From Saudi Arabia: Associated Extrusions, 17,150 kgs., Rs. 2,33,541; Continental Plastic Inc., 17,150 kgs., Rs. 2,12,411; Earnest Deco Pack Ind. Ltd., 17,150 kgs., Rs. 2,16,8 17,150 kgs., Rs. 2,33,541; E Plastic Inds., 17,150 kgs., 2,16,860; Ganesh Plastic In 17,150 kgs., Rs. 2,12,411; tional Products, 17,150 kgs. 2,26,868; Plastometal, 34 kgs., Rs. 4,53,736; Radiant P tics, 17,150 kgs., Rs. 2,16 Rohini Polymers, 17,150 Rs. 2,33,541; Sunshine Pl Inds. Ltd., 17,150 kgs., Rs. 2 868; Syncaps Pvt. Ltd., 17 kgs., Rs. 2,00,178; Vat Pla 17.15 Mts., Rs. 2,26,868; Singapore: Chola Packaging

00 kgs., Rs. 2,52,827; Enterprises, 49.5 Mts., 210; 16,000 kgs., Rs. ; Sakthivelu Poly Pack, gs., Rs. 1,89,280; Sri a Plastic Inds. P. Ltd., Rs. 5,16,688; Vikram ses, 24,750 kgs., Rs. 7; From Yugoslavia: B.C. la & Co., 16,000 kgs., 9,872; Sudarshan Engi- Inds., 16,000 kgs., Rs. 9; M. K. Diamonds, 80 s. 7,61,300; From Tai- M. V. Subramanian, 100 s. 17,96,752.

E: From Singapore: Indo al Ltd., 16 Mts., Rs. 31; Multi Poly Films (P) 9.896 Mts., Rs. 6,89,668.

YETHYLENE MOULDING ER: From Saudi Arabia: Anand Engineering Udyog, 17.150 kgs., Rs. 2,16,859; Prakash Plastic Works, 17.150 Mts., Rs. 2,26,868.

POLYPROPYLENE: From France: M. M. Rubber Company Ltd., 97,500 kgs., Rs. 18,85,200; From Singapore: Ananth Plastic Pvt. Ltd., 16 Mts., Rs. 2,88,422; From Belgium: M.M. Rubbber Co. Ltd., 225 kgs., Rs. 11,039.

PVC RESIN PASTE GRADE: From Japan: Omkar Printers Pvt. Ltd., 50 kgs., Rs. 1,932; From Korea: Premier Polycoaters Ltd., 25 Mts., Rs. 3,84,614.

PVC RESIN SUSPENSION GRADE: From Korea: Sakthi Sugar Ltd., 50 Mts., Rs. 6,73,391.

TEFLON: From Japan: Fluoro Plast, 75 kgs., Rs. 12,159.

RUGS.MATERIALS IMPORTED

MADRAS

rom 6.2.88 to 29.2.88)

ENOLOL: From UK: I E L 20 Nos., Rs. 558.

LCIUM D PANTOTHENATE: Japan: Eskayef Ltd., 200 Rs. 35,432; Kasturi Foods emical Ltd., 200 kgs., Rs.

CLOSPORIN: From USA: eli Pharma Foundation, 1 s. 22,629.

THYL STILBOESTEROL BP: From Italy: Medoph- 5 kgs., Rs. 57,189.

PAMINE HCL USP: From Pharm Res. & Analytical tories, 20 kgs., Rs. 59,361.

DRUGS: From USA: Dr. Bali Pharma Foundation, 2 kgs., Rs. 22,629.

EPHEDRINE HCL BP: From China: Mohan Pharma, 100 kgs., Rs. 58,119.

ETHISTERONE TECHNICAL: From FRG: Tamilnadu Dadha Pharmaceuticals Ltd., 100 kgs., Rs. 4,22,680.

GRISEOFULVIN BP: From UK: Imkemex India Ltd., 299 kgs., Rs. 3,60,368.

ISOPROPAMIDE IODINE UDP/MP: From Switzerland: Eskayef Ltd., 100 kgs., Rs. 1,30,605.

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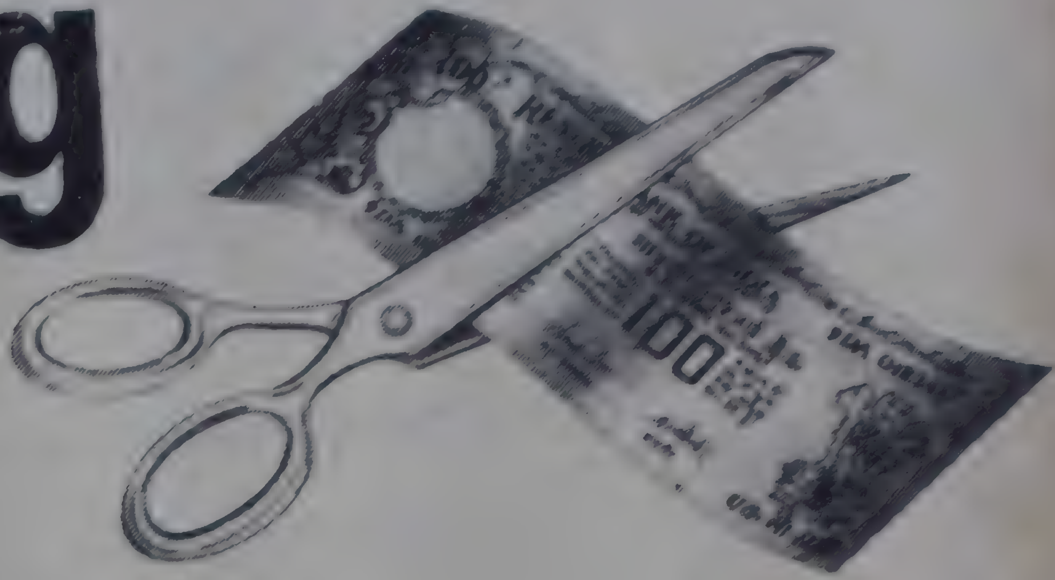

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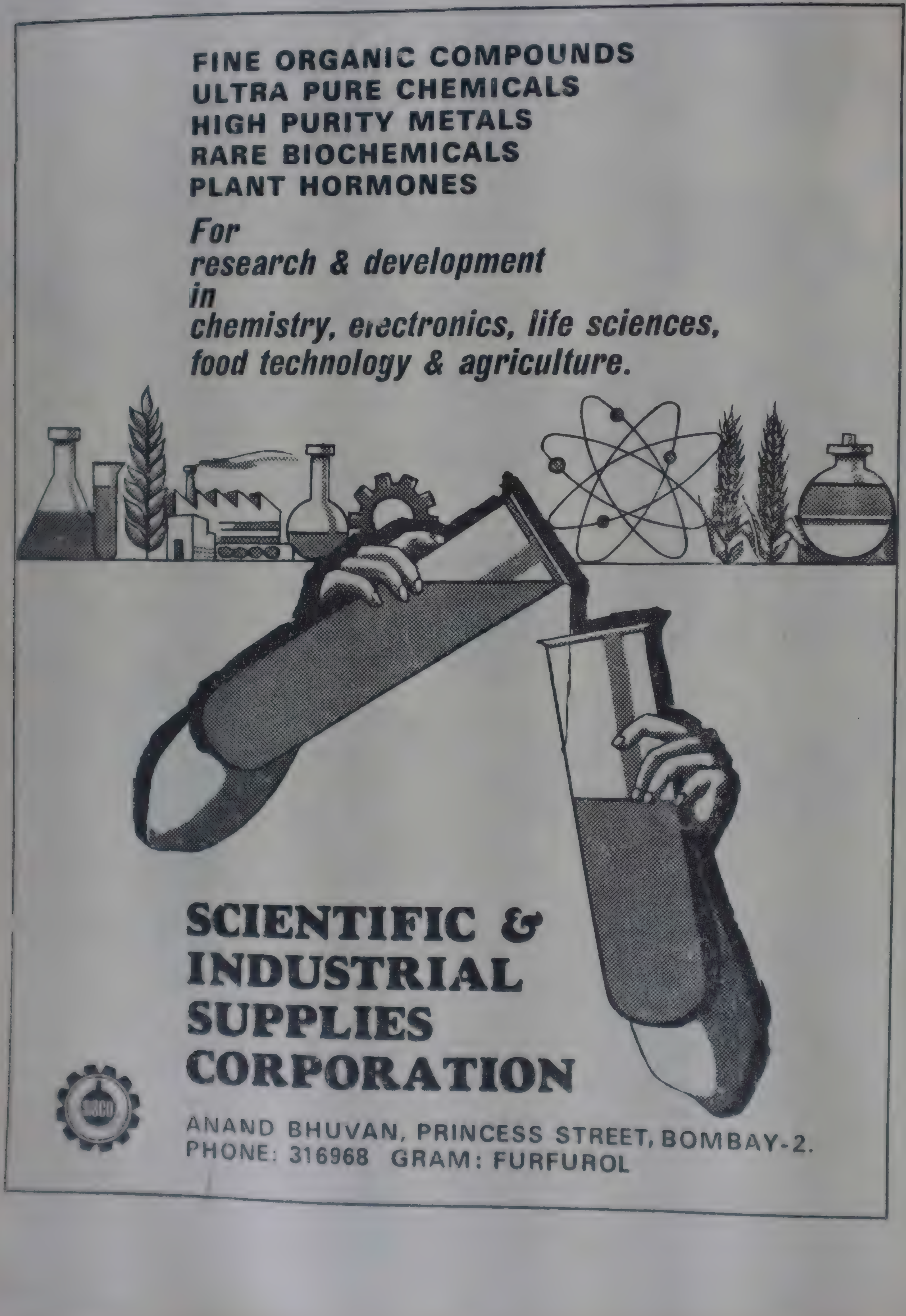

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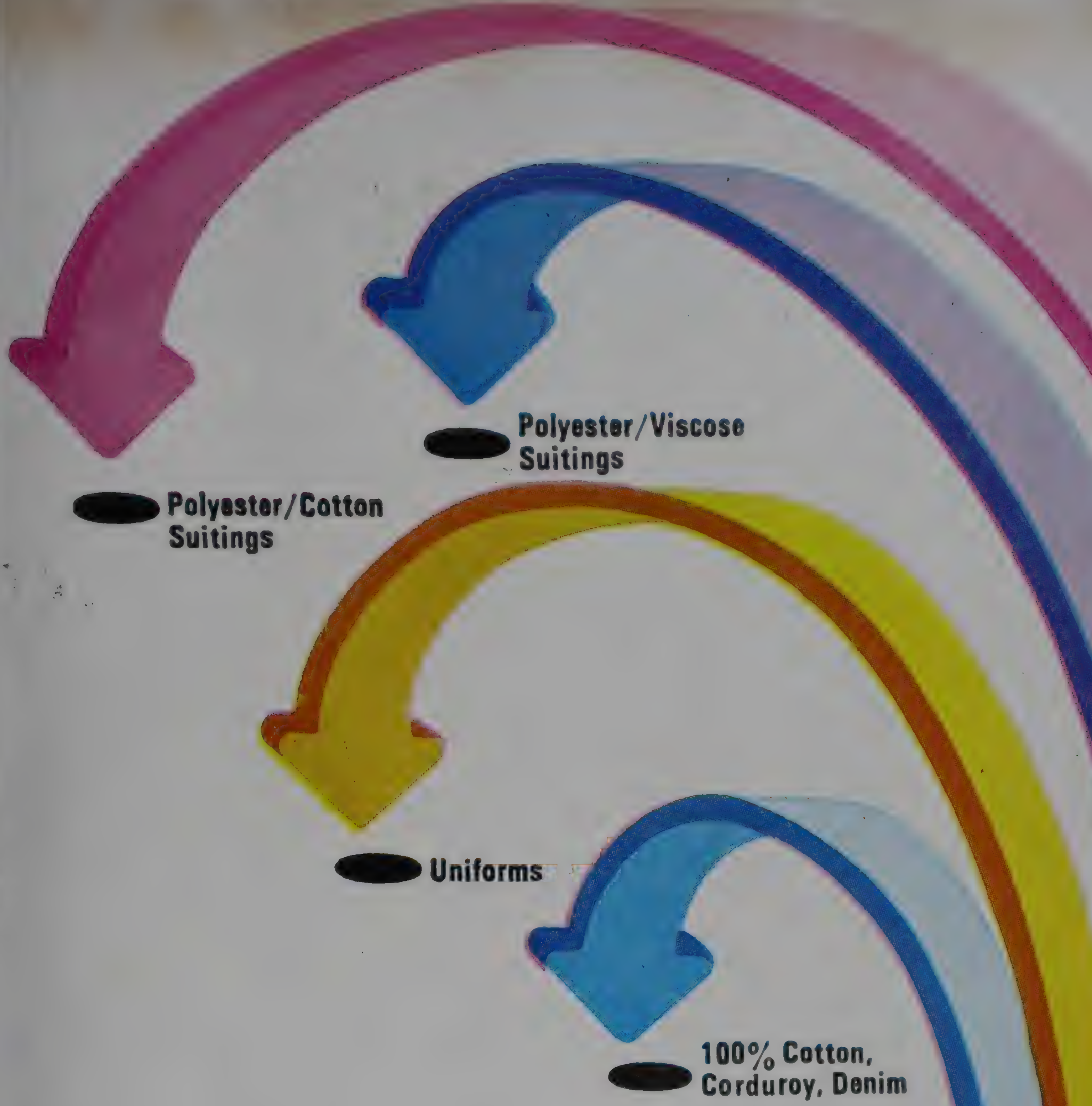
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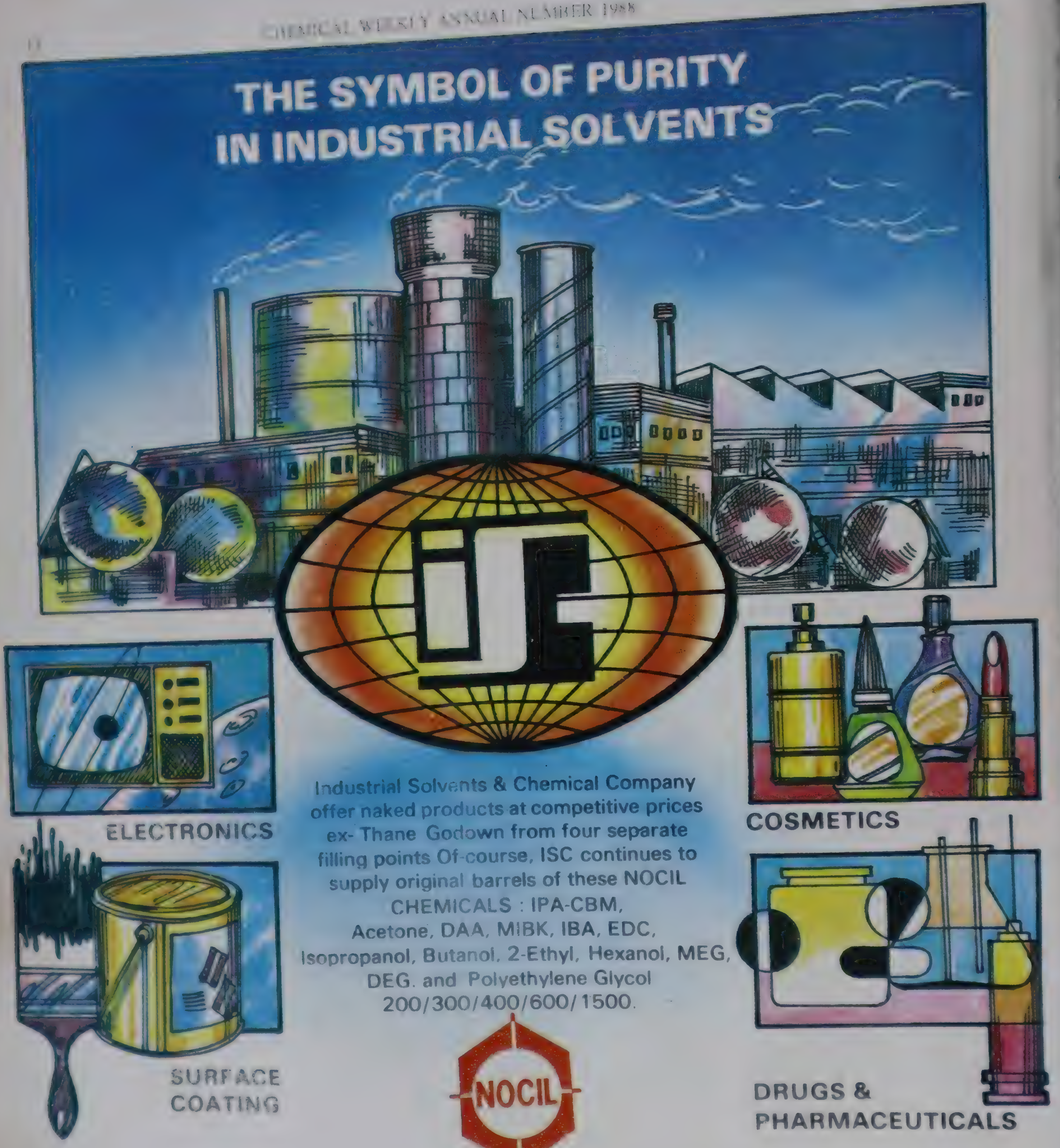
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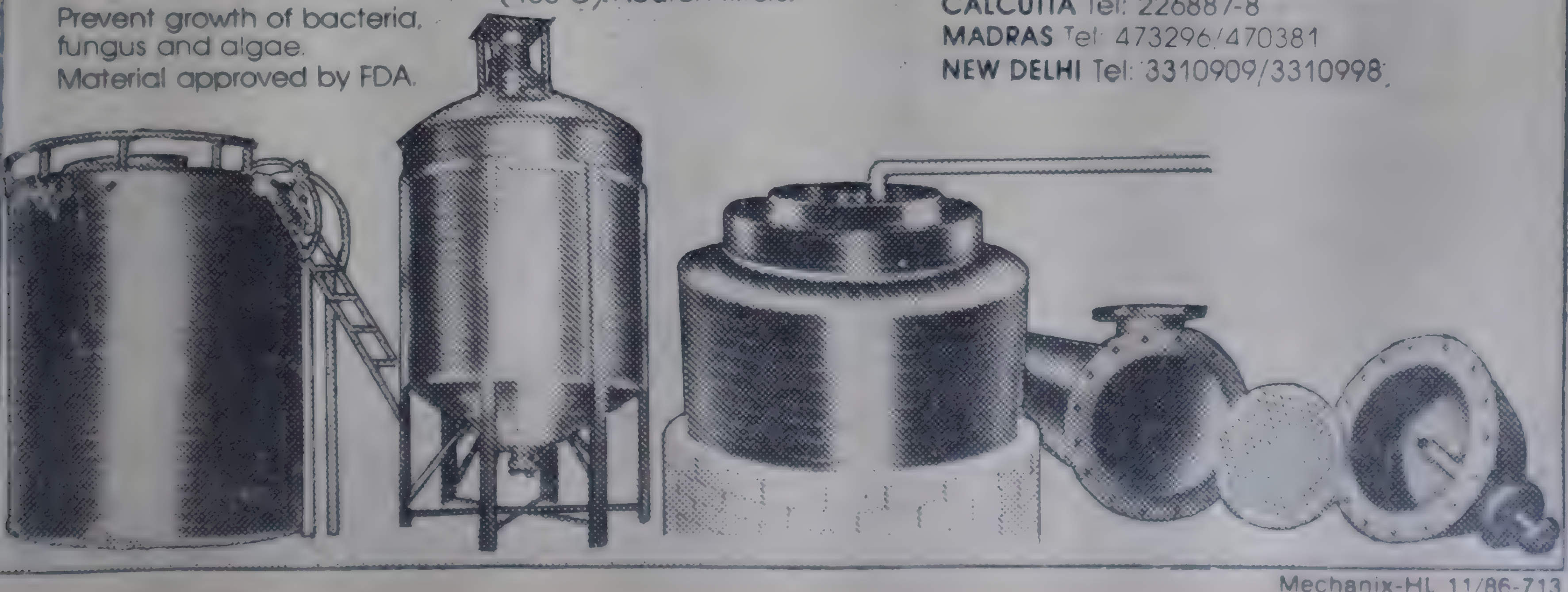

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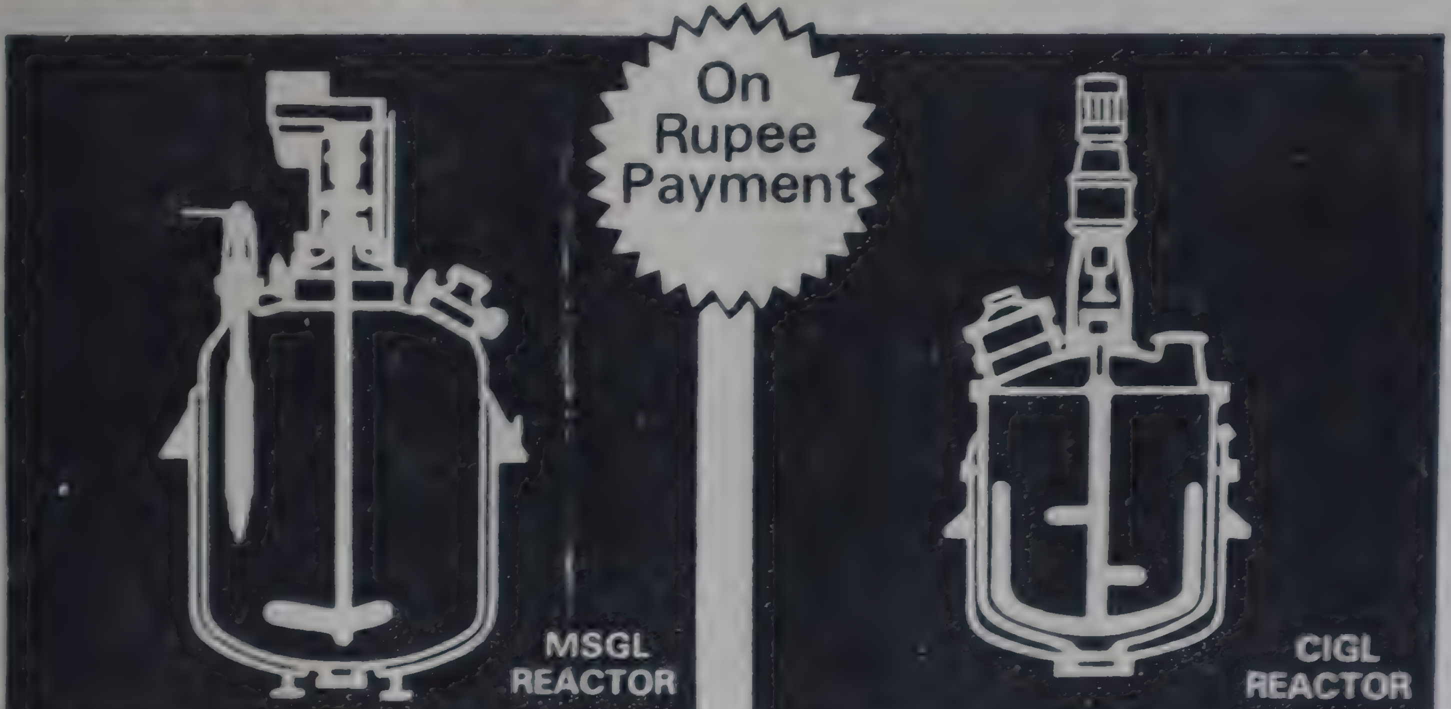

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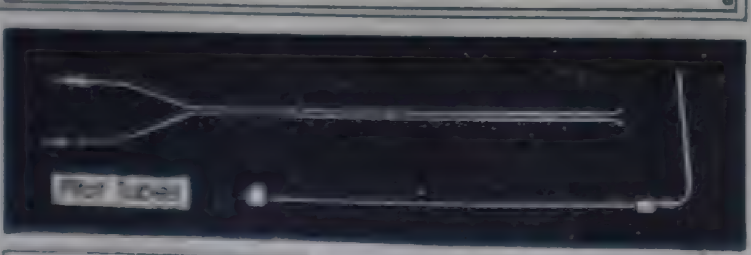

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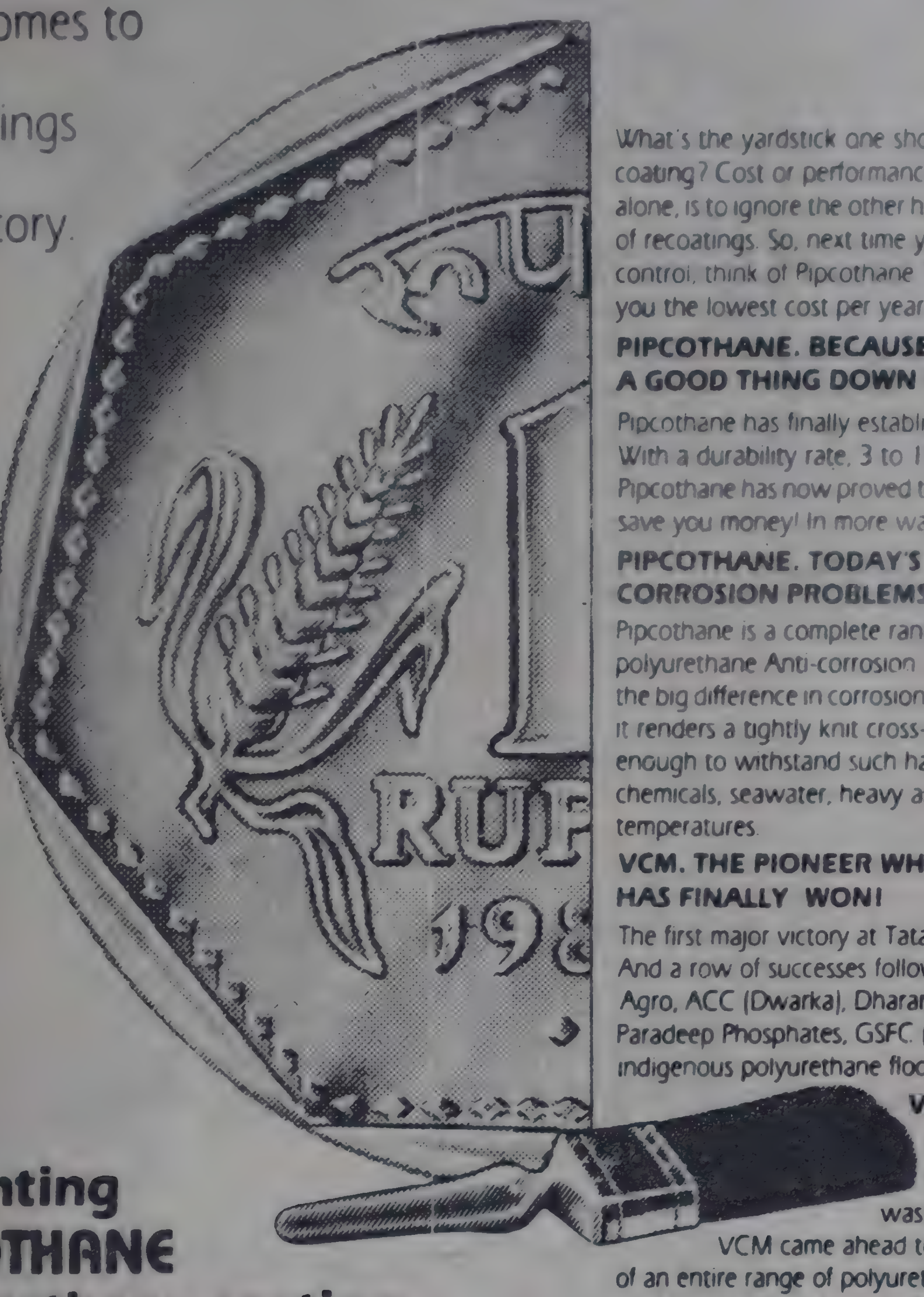

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RISING IMPORTS: CAUSE FOR CONCERN

Recent initiatives taken by the Government for accelerating export growth have resulted in a 50% increase in the exports of chemicals during the first quarter of 1988-89. From a figure of approximately 210 crores in the first quarter of 1987-88, exports have touched Rs. 320 crores. If this trend continues the annual target of Rs. 1,900 crores should be well exceeded.

While exports are growing, liberal imports atleast in two sectors viz. petrochemicals and fertilisers, are expected to soar to levels the country can ill-afford.

Increasing pressure of domestic demand is expected to take imports of thermoplastics to about 300,000 tonnes by the end of the Seventh Plan, even after taking into account the substantial expansion of IPCL which is expected to be completed by 1989-90. With world-wide ethylene supply becoming increasingly tight, whether by accident or by restructuring of capacity, prices of most petrochemicals have registered sharp increases. Combined with an import policy incapable of responding rapidly and justly to the vagaries of price fluctuations the domestic consumer has been left high and dry. Plans to set up a Petrochemical Production Development Authority to amongst other purposes, monitor levies so as to ensure supplies of principal raw materials at reasonable prices should hence be welcomed.

Equally distressing are the expected dependence on fertiliser imports. With atleast three major gas based projects unlikely to go on-stream till well into the Eighth Plan, the Seventh Plan target of 92.53 lakh tonnes of nitrogen is likely to remain unattained. The virtual doubling of prices of urea in international markets in the last few years is thus likely to play havoc with the countries trade deficit.

While some measure of self-sufficiency has been attained in production of vital raw materials such as, LAB,acetone, phenol, ethyl alcohol, etc. rapidly escalating, demand will require a continuous monitoring of production performance, capacity and demand. A small extent of self-sufficiency will provide relief to a deficit which if anything is cause for concern.

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The author, a doyen of the chemical industry, in a critical analysis of the performance of chemical industry, has called for radical reexamination of the targets. He advocates various measures to make the chemical industry healthy and growth-oriented. Blaming the Government for its lack of foresight in foreseeing the changing scenario in polymers all over the world, Mr. Trivedi cautions about the alarming situations in the availability of feedstocks of basic petrochemicals like BTX and ethylene glycols. As we move towards the 21st century it is the duty of captains of industry to so orient their functioning and their corporate obligations to society that the technology change can be ushered in more smoothly, more humanly and with minimum conflicts or corporate star-wars.

Shaping the Chemical Industry for the 21st Century
Part IV - Issues, Myths & Reality

D.M. TRIVEDI

It is almost two years since the Report of the Committee or Perspective Planning of Petrochemicals Industry 1986-2000 A.D.) was signed in September, 1986 and issued or public consumption. The Apex Committee in the above Report had made substantive recommendations for the growth and promotion of this vital industry and Government had declared it as a thrust area for rapid development. In my last year's study on this subject Part III published in *Chemical Weekly* Annual Number 1987, I had summarised the major recommendations of this valuable Report and discussed at length on the implications of these recommendations on the future of this industry and its impact on national economy on the assumption that Government will take all active steps to implement the Report with drive and imagination.

It will be worthwhile to assess critically the progress so far made on the major findings and recommendations of this Report and to see whether the rate at which we are moving can help us to reach our goals (Table I). Secondly, it will also be useful to critically evaluate whether several major issues raised in my above paper (Part III) based on studied indifference by the Apex Committee and its Panels have at least received attention subsequently and if not to reexamine whether the goals cherished to meet the targets and to make chemical industry healthy and growth oriented can even be accomplished as we approach and enter the 21st century.

POLYMERS & ELASTOMERS:

To begin with a look at the demand projections for these in Table I-A will show that by 1989-90 these will rise to a high of almost 800,000 tonnes. As against this at a recent Press Conference the Secretary, Ministry of Chemicals and Petrochemicals confirmed that the domestic production of polymers has risen from 270,000 tonnes in 1984-85 to 285,000 MT in 1987-88 almost 3 years for a small rise of some 15,000 MT. He admitted that indegenous availability is far below the demand estimated at between 650,000-700,000 MT leaving a big gap of close to 400,000 MT. No wonder that the trade and industry are seriously exercised about the grave shortage of polymers creating near crisis situation and endangering closure and sickness of the innumerable small and medium scale units. Now to tide over the crisis Government sent two delegations -- one to the West and another to the Far-East to strike deals with multinational corporations to help out. If Press Reports are accurate enough, as much as 340,000 MT of polymers are being offered from April, 1989 to December, 1989 at a high cost of over Rs. 380 crores. Mr. Khan is reported to have mentioned that international prices have substantially hardened and availability is extremely limiting. Government was aware that during last three years and more, the international scenario of polymers was undergoing serious restructuring, many leading companies were opting out of commodity polymers, numerous leveraged byouts and amalgamation of any number of companies were taking place, which in turn stimulated conditions for shutting out smaller and uneconomic plants all over reducing supplies of key feedstocks and ultimate products. In turn it was easy to generate international pressure for supply and a direct incentive to jack up prices steeply on all fronts. The high level committee which was set up to look beyond the present and plan for the future to 2000 A.D. did not show enough foresight to comprehend the sharp change and take timely steps for this. **At the same time our basic strategy for economic liberalisation compelling export orientation, inter[illegible]** petitiveness and scale economic concepts for industrial development was ushered in with big funfare. While this cannot be faulted specially in the background of match- ing development with mega size plants, there was no built in stretagy for speedy implementation of these mega projects. A look at the various Annexures under Table-I will show the tragic irony of the stark reality today that in 1989-90 most of the massive targets of demand are not likely to be realised, since most of the projections on which our plans and programmes were based to meet the demand are still gathering dust in the grand offices of the various ministries and their secretaries. (The M.G.C.C. cracker start up is expected early 1990 and may be fully in operation during 1991).

Notwithstanding the spade work done by the teams sent abroad by Government to mop up the polymers, it remains to be seen how quickly shipments arrive here to meet the market crisis and relieve the demand problem. More and more inputs will have to be the order of the day to contain the distress in the market place and to reduce the galloping rate of sickness of the industry units. The new Finance Minister has already in his very first public statement warned the Nation of serious foreign exchange crisis and has already signalled for the need for sharp increase in exports, alongwith curbs on domestic consumption to avoid sliding into the international debt trap. Side by side the high customs duties on imported polymer products and feedstocks which are being permitted freely under the present policies necessary to protect domestic production (which is too high priced), tend to distort the price structure of internally produced goods and services generating inflationary effects on the economy on the one hand and depressing the customer accessibility and acceptance of the high price products on the other hand. This situation in turn compells lower capacity utilisation of bench mark capacities resulting in still higher cost of production and lower margins and savings required for recycling for growth.

FEEDSTOCKS

A casual scanning of the present market scenario in respect of some petrochemicals and feedstocks will be revealing: Benzene — a basic chemical feedstock which till last year was available in plenty is now no more freely available except in rationed lots due to the commissioning of the two large LAB units as well as a large Phenol- Acetone complex. This has created a near scare for Dyestuffs, Paints, Rubber and other industries forcing Government to import this rather expensive feedstock. **Toluene, Solvent Naphtha** which were freely available earlier are now being rationed. In turn this has caused a painful chain reaction all along the line due to inevitable shortage of next lin intermediates for not only dyestuff industry but even drugs, paints, insecticides rubber chemicals and o organic chemicals industry. This grave situation is unlik to improve for at least a year and more. In respect of E **ylene Oxide** and **Ethylene Glycols (MEG)** there is panic in the market place. Both these items are produ from Ethylene as co-products of the Naptha Crackers in l ited quantities since major part of Ethylene was diver to production of Polyethylenes, PVC etc. Since Ethyl Oxide is extensively used in manufacture of surfactants in several other essential industries, its non availability caused a lot of idle capacity since it cannot be impor at all due to its hazardous nature. The same fate has ov taken MEG the basic building block for Polyester fib resins-film etc. and now to be imported. While a couple years back, MEG could be imported at lower prices a raging about $600-700/MT in any quantities today the sa is not freely available even at double the above prices. Wh on the one hand large size synthetic fibre units are set the problem of finding MEG to keep them running at e nomic level is proving formidable. The situation is unlik to improve at all for another couple of years till the Ma rashtra Gas Cracker goes in full production during 19 and Reliance Plant at Hazira beyond 1991. The Gujarat C Cracker which has been talked about for last 6-7 years h still not been given the green signal to go ahead and ev when cleared will take at least 5 years for start up. The p yester fibre industry which is galloping forward with se eral plant units in advanced stages of construction a planning will be severely constrained without adequate su plies of MEG internally unless the international supply s uation improves substantially. By present reckoning ev if the supply becomes somewhat easier during next ye there is no doubt that the price levels at which it will available will be much higher compelling the Governme to accept loss of customs revenue income by having reduce the duty rates sharply on such imports so that t P.E. fibre and fabrics can be marketed at manageable price The story of Government dithering on licensing of **Ca rolactum** for so long is already wellknown to need recou ting. G.S.F.C. plant at Baroda— the sole producer caprolactam (22,000 MT/yr nameplate capacity) was refus permission to expand to 50,000 MT for several years. It only now permitted to do so. The other plant F.A.C.T. yet to be commissioned, hopefully during later part 1989-90. Till both these capacities materials in 2-3 yea from now India will have to keep importing this expensi feedstock for nylon 6 at high costs. While Government lib erally allowed Nylon Filment Yarn and Tyrecord produ tion to be expanded sharply to meet the market needs, such foresight was shown for caprolactum pr ion speedily and the country continues to pay heavily his ministerial follies for all these years. Again in respect olyester fibre, the story of lousy planning of another **portant feedstock DMT/PTA and the famous Corate Star-wars between two business groups with the** vernment and the National Press playing shamelessly the overbial role of "monkey and the two quarelling cats" it too green in public mind to need any elaboration. **It is sential however, to recent that notwithstanding so uch mud spilling about import of the second hand MT plant and early warnings of doom about its funconing, its present status shows the highest capacity perrmance for months on end to international standards f quality so much so that today there is a mad-race etween all consumers to pick up every kilogram of this xcellent product (DMT).** With the PTA plant having come n stream at last, the position has eased to a great extent nd we are spared having to import this valuable feedstock t high cost to support our present capacities of polyester extiles. It is equally to the credit of the other group that t also commissioned the plant in a record time, by producing quality material for the first time in the country in such a large volume of 100,000 MT/year. While legitimate pride can be taken in this stage of planning it is a matter of deep regret to record that again the Government -- Ministry of Petroleum and Petrochemicals bungled seriously by not planning for and even sitting callously on the proposals for production of primary feedstock p-Xylene required for DMT/PTA despite the fact that the Indian Crude is very rich on aromatics, that the Bharat Petroleum Refinery was crying hoarse for setting up facilities to produce this versatile feedstock from its current refinery operations but is denied clearance so far. **At present all the p-Xylene had to be imported in thousands of tonnes yearly involving high foreign exchange outgo. Even now, the B.P.R. project is not cleared on one ground or the other by authorities at Delhi. As if this is not enough, even the State Government has sought to sit on its clearance from the environment angle, by listening to the threats of environmental Khomenis who have now become one more centre for control against industrial development.**

SABOTAGING THE PLAN

The above is only the brief review of the manner in which this big programme of petrochemicals plan is managed and implemented by Government today. The terrific lack of perspectives about synchronising the plan unit by unit and product by product will inevitably cause severe delays all along the chain and an even more immense expenditure of foreign exchange resources year by year -- a situation which we can ill-afford today as pointed out by Finance Ministe recently. It is small mercies that the Industries Minister i only now waking up to its promises to clear up the pendin project licenses for so many projects which have been o the shelf for last several years beginning from mid-Augus as per his statement of last week of July-88. If he stick to his promise then we can hope that the plans can be salvaged to a great extent in the coming years.

It may be interesting to list the numerous projects which are waiting to be so cleared not simply through token letters of intent but, all the way through in term of Finance Technology and Foreign Collaboration partnerships, location, Joint-Sector participation, feedstock tie-ups and what is essential, the time schedules. **It is essential to emphasise this because of the fate that has overtaken Haldia Project, Gujarat Cracker Project, Salimpur Project, Vizag Petrochemicals Project, MRL Petrochemical Project and even Mangalore and Karnal Refinary programmes.** It is hardly creditable that with so many refineries already established, Government takes so long to select a joint sector partner for every one of the above basic projects as also for second generation projects and requires 12-15 months just to prepare a project report for these plants. Year after year, we are importing several million tonnes of refined petroleum products and we have talked and sketched out plans for building refineries for many years but, have taken no decision on these till recently for only 2 of these. The Perspective Plan's basic recommendation was to build several refineries during the next 12 years to refine crude on the basis of demand rising from 50 million tonnes today to over 95-100 million tonnes by the year 2000 A.D. It was also the basic recommendation of the Apex Committee that as far as possible many of the feedstock plants should be set up close to Refinery units to ensure economies in movement of huge hazardous cargoes over long distances. **Why then is the Government not able to get to work on blueprinting the locations of new refinery's to be set up, determine their size-scales, the crude-stock supply sources, to start developing their own programme-independantly or jointly specially, when it is well recognised that these mega-size plants take anywhere between 5-7 years to be brought on stream from the conception stage? There is not a wink of doubt that unless we blue-print such a strategy from now on the Perspective Plan will remain no more than a badly readable copy of our National Plans.**

ROLE OF MULTINATIONAL CORPORATIONS

At this stage it is equally essential to underscore a major issue of policy regarding the role of multinational corpoporations dealing with high technologies in the implementation of these plans. The Secretary, Ministry of Chemicals and Petrochemicals has confirmed in his public statement after his recent visits abroad that several large multinational corporations have shown much interest for participation in petrochemical programmes. Categorically he has named Mitsui of Japan for Vizag project, Shell International and British Petroleum in Hazira complex, Linde of West Germany. It is on record that NOCIL has already tabled interest in setting up a large petrochemical plant with active financial participation of their partners M/s. Shell International. Government has still to clear this project which is lying moth-ridden for over two years. Against this, Reliance Companies rendevouz with mighty Du Pont is there for all to see today. This proves that given a chance they are willing.

Mr. Khan has not given any indication at all of Government's policy decision on this. It may be safe to admit that government has no specific policy for their role in this plan. In all these years of planning in the name of building self-reliance, we have strictly avoided any direct participation by multinational corporations in our major programmes. The I.P.C.L. plant was based on technology know-how imports from other countries. Even the latest one under construction -- MGCC -- also has borrowed heavily, know-how for all its products from abroad but has strictly kept out foreign capital participation. Only the private sector companies have been permitted to have minority participation by some foreign company under strict regulations of FERA Act. This may have been a good policy in those years when we were quite young about the industrial culture of the West. **Now when our needs are so high in foreign capital and know-how, when we have decided to set up mega size plants to face the world competitions, when we want to restructure our economy on the latest frontiers of science and technology inputs and above all when we want to accomplish this herculean task by the turn of 21st century, when the communications and information technology have strucken the wide world into a global village, can we continue to stick to the old policies adopted so far to achieve above goals?** It is true that we have since then shifted our position slightly and forward by inducing N.R.I.'s to invest in India, we have offered them incentives to meet our needs for foreign money and to some extent foreign know-how. Admittedly these small steps have helped to ease our constraints but only marginally.

We have to recognise now that the big multi-national enterprises and conglomerates have learnt their lessons after the examples of Japan, Taiwan, Korea and some other nations that by giving away know-how without direct or minimal participation they have raised competitors ac the world markets and in the process reduced their fi cial, technological and managerial prowess and hegen over world markets. Today it is clear for any one tc that they are fighting with the support of their own ernments to enter and participate directly in the marke Japan and other nations by threats of shutting out their ducts through tariff walls, quotas and by other means. T are no more willing to give away their knowledge or ex ience for a mass of know-how fees at least for high t nology industries. **With the opening up of China U.S.S.R. which are desperately wooing the West for t resources — financial, technological and scientific are willing to roll out the red carpet for them thro opening up industrial parks and other incentives, w chances India will have to speed up the developm based on the logic of our past experience and polic** Fortunately the present Government headed by Hon. Pr Minister, Rajiv Gandhi has already set the ball rolling step by step dismantling our Industrial Policy cul through opening up the economy and liberalisation of icies. Opening up channels for foreign capital in m innovative ways has impressed the Titans of the Indu greatly so far. Even the foreign conglomerates are lure come to India on the promise of "One Window" clear for their participation, by-passing a maze of our restrai

Our numerous steps on computer revolution for In nuclear technology muscles, our space technology effc our ocean resources harvesting efforts no doubt impr them. Despite these, if they feel reluctant to come in, i obvious that the memory of their experience of their p limited association here is not totally erased. **The boot out of IBM and Coca-Cola from India, the takeover Foreign enterprises (Refineries), recent takeover of P lips, Ammoco investment in Indian companies and l but not the least the Pepsi-Cola affair may tend to cre doubts as to the credibility and coutinuity of our soc political structures.** If the above analysis has some m then our Government has to seriously review our polic voluntarily now if not by compulsion later (witness Japa predicament today being forced to permit U.S. natio companies to trade and establish within Japan — so lc denied to them). **If rapid industrial development to era icate poverty of millions of people is the goal of our pla ning there is Hobson's choice for us for giving up the policies step by step and to revise the policy stretegy least to permit foreign participation in selective ar of technologies and without onerous conditions ab export obligations, locational constraints and other d criminatory controls which have been the bane of o self-reliance policies all these years.**

R.T.P. & FERA HURDLES:

Simultaneously, other steps will need to be taken to pro- l this industrial momentum forward. The Indian part- s of such enterprises will need to be released from the ackles of MRTP Act. In fact, today with public sector terprises being in a commanding situation and not sub- t to MRTP legislation, Governments declared policies stimulate competition not merely in the International mar- ts but even more within the domestic markets, delicen- ng of a large group of industry areas/products enabling nyone to set up plants anytime except those specially eserved for small scale units, and encouraging setting up arge size economic units through the system of financing nstitutions support rather through Administrative Control nd regulation, where is the need to subject any unit to the urisdiction of Monopolies Act at all? **It is time now in the present scenario to withdraw the Monopolies part of the Act and reframe the Law to oversee only the Fair Trade Practices of the trade industry. It would be most logical for Government to label the new Act as Fair Trade Practices Act with the intention to oversee but not regulate the consumer interests and to bury the ghost of Monopolies of Indian Industries which by world standards of economy are indeed dwarfs.** This step will greatly relieve industry from the agonishing delays in the clearance of the projects and mountains of beurocratic paper work and also acting as a means of relieving paper shortage in the country. **It is to be hoped that the present Government will in the short time now available to it before the next general elections take adequate steps to ensure that this much admired economy liberalising policyprocess is made irreversible in design so that the nation can move forward with speed and effectiveness to achieve these goals.**

FINANCING THE PROGRAMME

Another essential prerequisite to move forward in this programme rapidly lies in setting up a full proof budgetary provisions on a project to project basis related to specific time schedules. **Except for broad indicative budgets in the estimates of some of these projects, there seems to be precious little spade work done about how much external and rupee funding will be required for these and in what matter these resources will be raised and funded.** Several local industry groups have lined up with their proposals for quite sometime now for each of these projects. These will need to be updated and can be easily done on a time bound basis once the selection of a party for a given project is cleared. Parties themselves have to firm up financing proposals within a stipulated time. The way our licensing system has worked so far and the manner in which data is presented in licensing applications is totally inadequate for authorities to judge and decide between one party or another. Once the different parties are clearly told to present specific data for a given project which must include party's capacity for internal generation of funds, capacity to borrow from abroad and internally and its competence to deliver, there need be no hesitation to move forward on "one window" clearance basis for such large projects to complete other formalities. **As for foreign exchange funding some loan resources can be earmarked for petrochemicals projects on priority. If need be, since this programme is a recognised thrust area, Government should even opt for raising from World Bank and other allied aid institutions a specific loan amount in the range of Rs. 5,000-10,000 crores in foreign exchange to be earmarked project wise and drawable during specific intervals and time schedules.** This can be handled directly and to some extent through National Institutions like IDBI, I.F.C., ICICI, UTI and others. Once such funds are earmarked, progress can be very quick. Since the Government is presently under numerous pressures from different areas of economies the problems of funding petrochemical projects from general budgetory resources becomes halting and uncertain delaying project implementation seriously. **There is therefore, a crying need to organise the funding process, on the lines suggested above. At the same time as discussed above there need be no hesitation today to avail of resources of multinational companies at this stage since their participation will not merely assist in foreign exchange resources but also provide the state of art technology, supplemented by enhanced export markets and managerial expertise to handle large complexes both nationally and internationally.** If India desires to enter the 21st century as a fully developed nation and not lag behind China and even other Asian and South American Nations the massive development of Oil and Gas based Petrochemical Industry provides a positive step to this end along with some other sunrise industries.

SUNRISE vs. SUNSET INDUSTRIES — PRIORITIES:

At this stage it may be relevant to pose the basic question as to whether the priority being accorded to this plan, notwithstanding the postulates of the Kapoor Committee recommendations for pushing ahead with Petrochemicals plan involving huge resources by incurring foreign debt, is the right one when so much needs to be done in the existing industrial structures for injecting new technology, innovation, managerial expertise and requiring enormous funds. **There is so much talk about the need to transform the**

economy through building up "Sunrise" industries at the expense of the so called "Sunset" industries. There is so much sickness in our Indian Industries all round in Steel, Textiles, Engineering involving thousands of crores of rupees. Hundreds of large units and hundreds of thousands of small and medium scale units are labelled sick across the industrial landscape of India and what is more this spectrum is growing day by day. In the developed world also these problems exist, but they are being continuously sorted out through well known means of amalgamations with healthy units, State Financial Aid for viable units, easing of statutory laws to provide relief and finally by permitting them to close down the shutters. The Indian scenario in this respect is not as helpful. The process by which amalgamation and merger can be settled in India is riddled with too many statutory and legal hurdles and highly time consuming. The Industrial Labour Regulations are so designed that closure of even a nonviable unit or even a section of the unit is just not feasible without going through the highly complex Judicial process which is not only time consuming but enormously wasteful in every sense. If the Finance Minister's outburst about resource constraint is valid what priority can be assigned to the sick units and for speedy modernisation of existing industries which at present level of older technology cries out for innovative technology for quality improvement, energy conservation and high productivity? The Apex Committee recommendations on these points are grossly limiting, inadequate and lacking in the sense of perspective. **If the existing units are to be allowed to import technology on marginal cost within strictly controlled parameters of foreign exchange, balancing equipment additions and limited output expansion , then how will these industries ever develop their strengths to meet international competition and even internal competition with newer giant units? Will these over modest period of time not become sick?** This point was debated in one of the panels and in my Part III article, I had elaborated on this. At the cost of repetition I quote this very important issue once again viz;

> One of the most important areas of concern relates to "Modernisation of Existing Units" established in earlier years operating today without the benefits of scale economics and obsolete technologies relative to present levels of technologies. This issue was raised by one of the members of the Sub-group on Polymers, Sri. M.S. Patwardhan, Executive, Vice-Chairman of NOCIL, Bombay. He stated this fundamental problem as under:
>
> "There are several petrochemical units in the country with capacities considerably lower than the minimum operation capacities recently announced by the Government. These units need to be encouraged to modernise an expand their capacity so as to be competitive in th emerging petrochemical scene in India. **If not they wi become sick and die over a period of time creatin difficulties for their employees and the communit let alone waste of national resources invested in them** Hence, it is necessary that modernisation and expansio of existing units is given the highest priority in Indi Conflicting objectives such as geographical dispersio which tend to reduce plant sizes to lower than economi levels and increased investment on account of new infrastructure facilities to be built should be avoided".

It is most unfortunate that such a reasoned statement c a distinguished member of the Panel and the head of th pioneering petrochemical unit in the country has fallen o deaf ears of the Apex body. The same myopic vision ca be attributed to the Apex body in having avoided/failed t apply its mind to the struggling ethyl alcohol based industries in India. These units are very small by today's standards of scale economics, the feedstock alcohol suppl demand situation is patently irregular and dependent o sugar season year after year. Unfortunately it is regrettabl to have to record that the same industry groups have established such a vested interest in perpetuating the presen status quo on size, technology and price manipulations tha they are opposing any and every step for induction o modern technologies and economy scale concepts. **Thi kind of cultural paralysis has plagued many segment of National Industries, the Textile Industry being on of the largest segment followed no less by Jute Industr and many others. N.T.C. -- the largest conglomerate --i the product of this culture.** On the other hand is to be seen a great crush between several captains of industry and trade competing fiercely with one another in capturing licenses of the newer industries like petrochemicals, electronics communications etc. with no holds barred. **This cultural divide -- which is tending to grow wider and deeper --is to be seen in the recent Corporate Star Wars between leading industrial groups. The recent conflicts have been so much publicised that it is needless to recount these except to say that such public demonstration of ill-advised corporate behaviour has not merely tarnished the corporate image of industry abroad but, has generated skepticism and diffidence in the investing public and people at large.** It is not that such conflicts of interest do not occur at other places, but the kind of **"shoot-out"** **witnessed in India** has not been reported in Japan, and other industrialised countries. **When India is gearing up for quantum jump towards rapid industrial development what is expected of leaders in business in industry and trade is more homogenity and cohesion, readiness to col-**

rate and sharing a pie, supporting and strengthen- existing structures (rather than dividing FICCI- OCHEM-IMC) and in many other ways so that the rld opinion feels reassured and motivated to support efforts.

n my recent role, and experience about a few sick indus- es has enabled me to look for causes for sickness of indus- es. Much has been written about the causes, solutions have en proposed, and many remedies attempted for correc- on but the results of achievement are none too many so r. Meanwhile, more units are becoming sick while new nes are born spurred by incentives provided by the States several forms. My own experience, limited as it is, how- ver, leads me to a view that the present attempts at diag- osis of sickness are too late and remedial measures of estructuring managements, enforcing financial discipline tc. however essential, fall for short of what needs to be lone early enough before the unit gets sick. What I have bserved in the sick units, I have served, is first and fore- nost top management overconfidence about their units and ack of vision to perceive the change and therefore, their nability to react in time. This has happened in the fibre plants where the technology and plant established 20-25 years ago continued to be operational even at present not withstanding the clear evidence of sharp changes in technologies and techniques having been established next door. The second observation pertains to organisational structures which were allowed to be fossilised through coercive system of secrecy, immobilisation of functions resulting in limited experience and expertise of technostructure. The third major aspect concerns about the absence of concept of planning for future growth to meet the challenges of change and absence of any effective organisation to monitor the change and to take remedial measures at the right time to manage the change. **Once the unit gets caught in the debt tra it becomes difficult to rescue it due primarily to funding problems which cast their dark shadows on management, technology, modernisation and diversificatio and market related changes essential for survival.**

CULTURAL DIVIDE OR SYNTHESIS:

In highlighting this problem of sickness at this stage my purpose is to focus on the imperative need to harmonise as far as possible the corporate cultures of the existing industrial class with the emerging enterpreneurial class loaded with new technology flashing toys, rather than force the divide still further. **For the more, these new mega units get established without corresponding forward movement of the existing units the greater will be the conflict of interests. As we move towards the 21st century, it is the duty of captains of industry to so orient their functioning and their corporate obligations to society that the technology change can be ushered in more smoothly, more humanly and with minimum conflicts and corporate Star Wars. For India, at this stage of development, we have compelling need to strengthen so-called sun-set industries as much as to set up sun-rise industries side by side.**

The socio-politico-economic situation of our society presently is none too easy and is in flux and it is anybody's guess what the next year will be like. Trade and Industry has to operate in this rather unstable environment which can be made easier to manage if they learn to cooperate with external forces, provide and strengthen the forces which focus on stability and creative change and above all establish high values in their personal and corporate life to secure the societies well-being.

TABLE - I

ANNEXURE-A
Summary of Demand Projections for Plastics & Elastomers

('000 tonnes)

Polymer	1989-90	1994-95	2000AD
Commodity Plastics			
LDPE/LLDPE	229.0	482.0	708.0
HDPE	178.0	378.0	585.0
PP	72.0	286.0	420.0
PVC	233.0	485.0	713.0
PS	38.0	82.0	120.0
Sub Total	*750.0*	*1,713.0*	*2,518.0*
Small Volume Thermo Plastics			
ABS	12.0	24.0	35.0
PMMA	10.0	16.0	24.0
Thermosetting Moulding Powder			
PF	7.0	8.1	8.9
UF	4.3	4.9	5.4
MF	1.3	2.1	2.7
Performance Polymers			
POM (acetal)	1.3	4.5	--
PA	8.0	16.0	--
PC	1.5	5.0	--
Total Plastics	*785.4*	*1,793.6*	*2,592.0*
or say	*790.0*	*1800.0*	*2,600.0*
Elastomers			
Synthetic Rubber	98.0	156.0	212.0

(For Notes Refer to original Reports of Panel)

ANNEXURE-B
Demand Projections for Synthetic Fibres

('000 Tonnes)

	1989-90	1994-95	99-2000
TOTAL MAN-MADE			
a) Cellulosics	150	150	150
b) Synthetics	335	614	985
Nylon (20%)	67	122	197
Acrylics (15%)	50	92	148
Polyester (65%)	218	400	640
PFY (60/50)	109-131	200-240	320-384
PSF (40/50)	87-109	160-200	256-320
Nylon Tyre Cord	40	50	61
Nylon Industrial	6	18	35

(For Notes to above please refer to Panel Reports)

ANNEXURE-C
Summary of Demand Projections for other petrochemicals

('000 tonn

Product	1989-90	1994-95	99-2
L.A.B	145	287	4
Alpha Olefins	Nil	60	
Petroleum Resin (Aliphatic)	6	9	
para-Xylene	147	255	4
ortho-Xylene	71	106	1
Benzene	353	578	8
Toluene	51	62	
Ethylene Oxide	19	24	
Ethylene Glycol	91	165	2
Formaldehyde	131	174	2
Propylene Oxide	19	NA	N
Plasticizer Alcohol	37	57	
DMT/PTA	226	393	6
Acrylonitrile	73	140	2
Caprolactam	116	191	3
Methanol	200	245	2
Phenol	49	68	
n-Butanol	18	23	

ANNEXURE-D
Committed Requirements

(Million tonnes/yea

	1989-90	1994-9
Reliance Polyester	0.170	0.170
Haldia Petrochemicals	0.264	0.330
Saleempur Aromatics	--	0.382
BPCL Xylene	--	0.165
NFL, Nangal	0.060	0.080
Nagarjuna Fertilizer	0.060	0.250
Cochin Aromatics	0.113	0.140
Rama Petrochemicals	0.060	0.060
MPCL Isoprene (Condensate)	--	0.125
	0.727	1.702

ANNEXURE-E
Prospective Requirements (8th & 9th Plan)

(Million tonnes/yea

Naphtha Cracker, Vizag	..	0.75
Aromatic Complex, MRL	..	0.20
New Fertilizer Plant, NE	..	0.36
Naphtha Cracker, Mangalore	..	0.38
Gujarat Cracker*	..	0.30
GSFC, Baroda	..	0.36
Total	..	2.45

*** If based on NGL, Naphtha requirements will be less by 0.3 millio tonnes.**

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Further, we have also presented a table of 3000 chemical products imported by U.S. last year under Tariff Schedule 4, Part 1B of USA along with the annual quantity imported which provides scope for export of each product. The details are presented in separate tables for **organic chemicals, intermediates, drugs and pharmaceuticals, dyes, pigments and toners, essential oils, perfumery chemicals and miscellaneous products** such as synthetic resins, pesticides, textile auxiliaries, surface active agents, printing inks etc, amounting to **2075 million pounds,** valued at **US$ 2145 millions**. These data are based on the analysis of invoices covering imports through principal U.S. customs districts. At present India's share amounts to only 0.3% valued at US$ 2.7 millions.

The report is an indispensable document to all merchant exporters, company directors, sales managers, corporate planners, market researchers, indenting agents, trading houses, export agencies, manufacturers, processing units, consultants, banks, financial institutions, new entrepreneurs etc to identify the untapped exportable products. The cost of the above "Export Market Survey Report" will be Rs.3,000/- (Rupees Three Thousand Only) and is to be paid in advance by D.D. in favour of "Tamilnadu Industrial Consultants", Madras which may be forwarded to:

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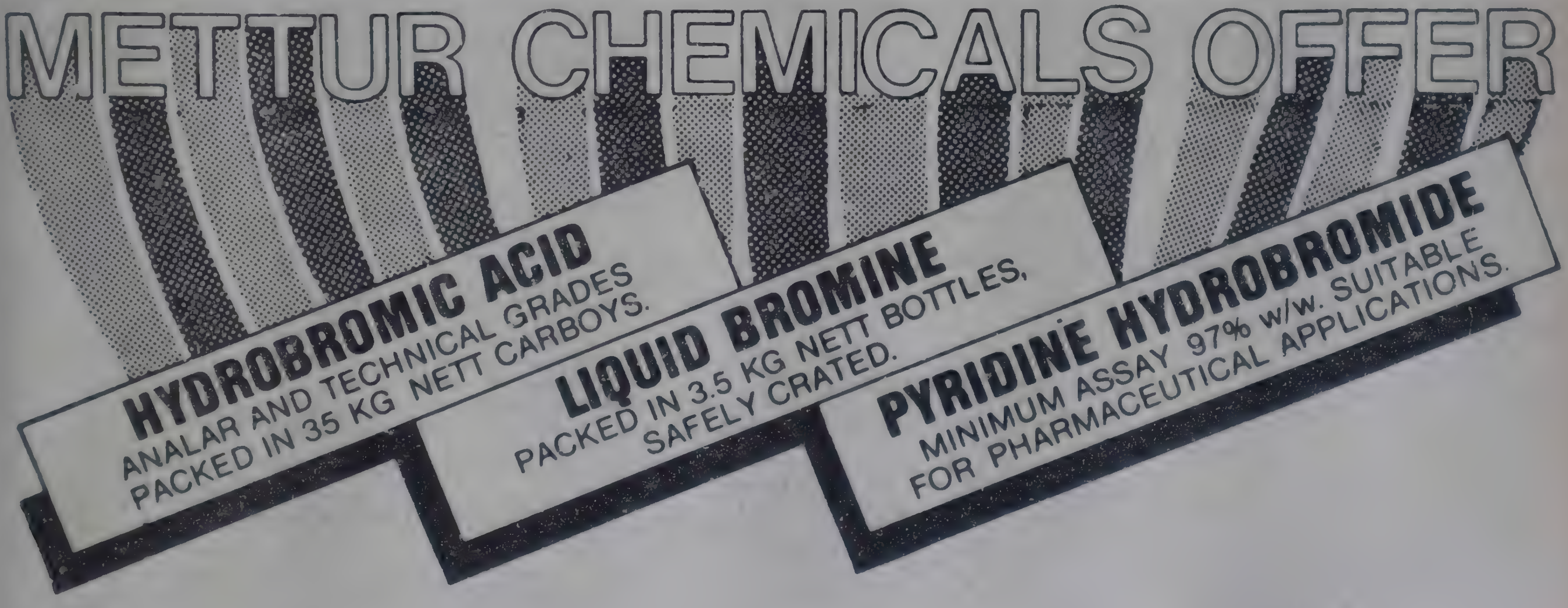
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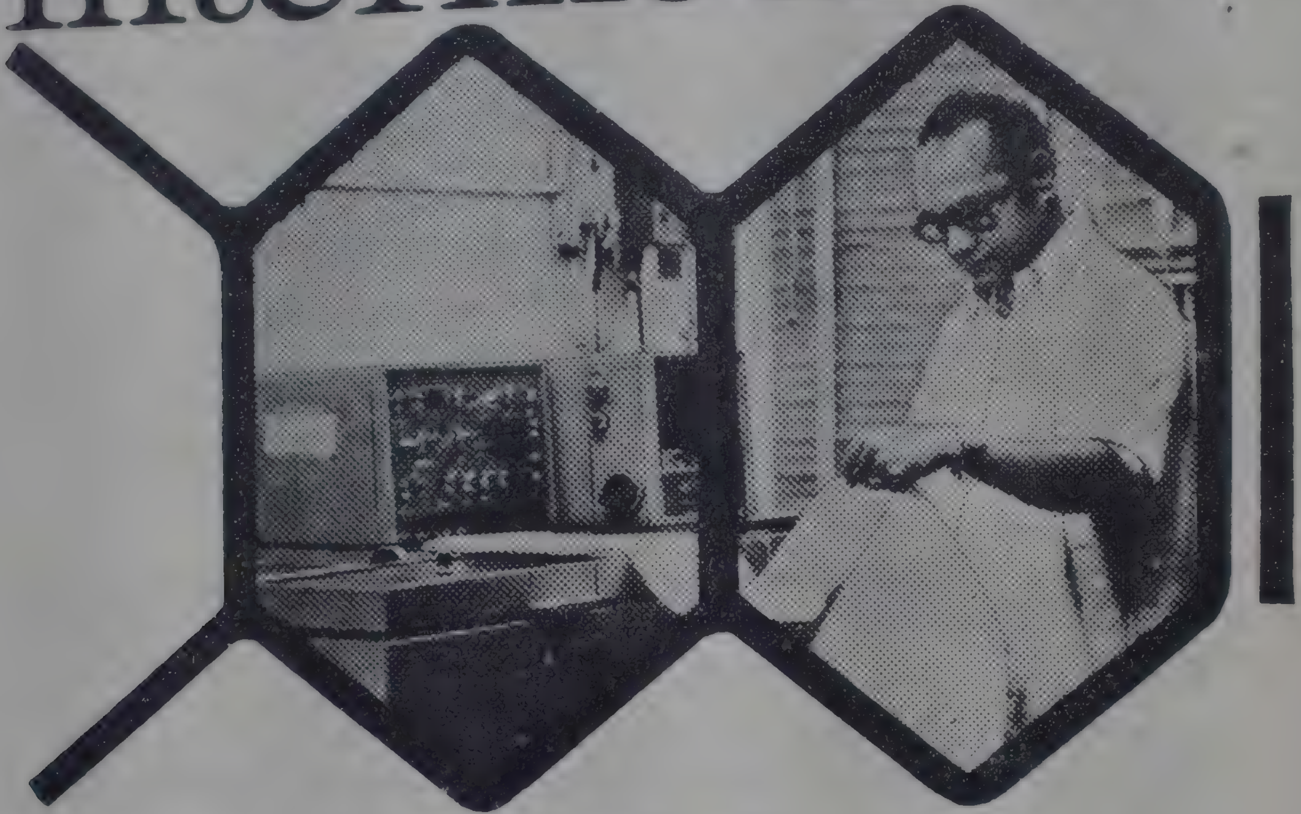

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In the emerging scenario of petrochemicals feedstocks, the emphasis has slowly and steadily been shifting towards lower costs and competitive production with less energy utilisation. The author, a well known authority in petrochemicals, discusses the various changing technologies in the fields of basic feedstocks of the petrochemical industry. This country has excellent opportunities for selecting technology in relation to our sources and needs. Further R & D efforts in this area need to be planned.

Shifting Technologies in Petrochemicals

S.L. VENKITESWARAN

Petrochemicals are the largest growth sector among hemicals today even if the spectacular growth of the six-ics has slowed down. Developing countries have to build up the sector at a fast pace to catch up. The "Oil Shock" of the Seventies did result in repercussions in the chemicals based on petroleum feedstocks but, this was a small temporary phase. It was soon realised that there was no ready substitute for petrochemicals which had become an integral part of life styles and the economy and there was no possibility of "back to natural products" in the case of many essential activities. Energy wise it was clear that petrochemicals were more attractive for example plastic bottles vis-a-vis glass, or film packaging vis-a-vis paper or board, or some of the substitutes for plastics for metallic components. Plastics as engineering materials has made great advances while synthetic fibre materials for textiles have taken over and displaced the bulk of cotton, rayon and wool. The prices of substitute materials from agro sources were higher due to the large energy inputs for agriculture. Energy costs are linked to petroleum and dictated by petroleum prices. It was feasible to pay higher prices, for petroleum feedstocks for conversion to petrochemicals and maintain their applications unabated and the last few years have seen a full revival of petrochemical growth in the West as well.

But there is a basic difference in the trends of recent years. Changes in technology and raw materials have shifted regularly and frequently towards lower costs and competitive production, less energy use through better conversion efficiency, broader spectrum of product grades to meet specific needs as in the case of plastics or elastomers or detergents, reduction of wastes or pollution from the production technologies and so on. There has been the need to adopt to the changing patterns of feedstocks available from petroleum sources which after all are meant basically to cater to varying fuel needs of the economy. Petrochemical processes are modified to suit the liquid or gaseous components that are available readily. Technological shifts are a dominant feature of petrochemicals and the technology choice has to be integrated to the social situation needs and priorities of the economy, resources available indigenously, or from imports, level of the country's developments, impact of the petrochemicals on the natural alternatives available and other aspects. This review is intended to highlight briefly the technology shifts and trends in petrochemicals, to provide guidance in technology choice or planning in the coming years. Most of these trends have been mentioned in the columns of **Chemarena** (*CHEMICAL WEEKLY*) but an overall picture would be useful.

The developments in the field of petrochemicals may be classified as under:

1) Shift in the use of feedstocks such as naphtha, heavy oils, natural gas liquids, methane and ethane.
2) Changes in the primary process conditions resulting in varying yields of the reactive olefines so as to provide a better spectrum of products to suit market conditions.
3) New products and intermediates from the olefines or aromatics.
4) New routes to the desired product from the basic feedstock resulting in lower costs or better range of product characteristics.
5) Improved catalysts for conversion/polymerisation with greater yields and reaction rates and reduced energy needs.

Generally speaking, there are hardly any new products in the last two decades but, many technology shifts in the conversion methods such as for example the shift to pure terephthalic acid from DMT for polyester fibres and acetic acid from methanol and carbon monoxide. Catalyst improvements have revolutionised the olefine polymerisation. Direct dehydrogenation of the saturated hydrocarbon to the olefine like propane to propylene and isobutane to isobutylene has recently come up and can lead to a basic shift in the concept and organisation of petrochemical complexes. Some new products developed such as the group of ethylene-propylene terpolymers for use as elastomer not fulfil the early promise while a new product like MTBE — methyl tertiarybutyl ether — has taken off in a big way as a result of changes in product specifications for environmental reasons viz. progressive ban on TEL in gasoline with MTBE a good substitute. IPCL had made a study of technology developments in petrochemicals for detailed consideration by an expert group to provide guidelines in technology planning in petrochemicals — both of available technology for use and for organising R & D efforts for the future. This review can only indicate some of the technology shifts which have already taken over or expected to dominate in the coming decade or two.

Shift to lighter feedstocks

Ethylene and Propylene have been mostly derived by steam cracking of light naphtha in Europe and Japan and from NGL to a great extent in U.S.A./Canada. In the Seventies when there was uncertainty of getting adequate supplies of light naphtha, a marked tendency was to crack middle distillates also and to provide flexibility in feedstock use at a higher investment. This shift was short-lived when supply situation eased and the tendency was to maximise ethylene yields through developments of the higher temperature/short residence times for cracking. The supplies of NGL were also easier with a large trade across the seas so that the use of NGL for cracking was on the increase. The entry of Gulf Countries into petrochemicals with their very low cost ethane/propane from flared gases stepped up the use of NGL or associated gases for olefine production. One estimate is that the ethylene potential from NGL is 26 million tonnes or more and production costs are lower by as much as one fourth compared to naphtha. Gas cracking limits the supplies of propylene and butadiene but the need to convert heavy oil residues to lighter distillates by catcracking provides a ready source of propylene and butylenes. India is well placed in the supply of ethane fraction for cracking and two large gas crackers are expected to provide the bulk of ethylene requirements taking advantage of improvements in the gas cracking process in recent years. Use of light naphtha for cracking will continue at IPCL and NOCIL and at Haldia Petrochemicals when it finally takes off.

Syngas and C_1 Chemistry

C_1 Chemistry or the synthesis of commodity chemicals from a single carbon unit is expected to play a major role in the future displacing ethylene to some extent. C_1 Chemistry is essentially syngas ($CO + H_2$) chemistry and based on methane as primary source but it has links to coal which is also a ready way to syngas. Coal gasification assumed importance to South Africa for her liquid fu various modifications of the Fischer-Tropsch sy been investigated with different catalysts an While F-T yields a group of products, the syngas specific products, directly or via methanol as pr mediate. Natural gas or methane availability a stimulated this C_1 Chemistry era and even mo from methanol is being made in a landmark p Zealand. On the chemical side the carbonlyati anol to acetic acid (and later to acetic anhydride) an outstanding success and generally displace based acetic acid.

The advent of ZSM-5 Zeolite structured ca important landmark. While the reductive olog of carbon monoxide to hydrocarbon fuels (g commercial under special circumstances, modif catalysts for yielding C_2 to C_4 olefines and C_6 matics are under development and homologatio anol to ethanol shows promise. Acetaldehyde is a of ethanol in a cobalt catalyst reaction of me syngas and is expected to be competitive with th oxidation of ethylene to acetaldehyde. Use of m mate as intermediate and its isomerisation to ac also worked out as alternative. Catalytic oxidation formate yields dimethyl carbonate and its chlori lead to dichloro methyl chloroformate, a safe sub phosgene. Syngas can yield a mix of C_1 to C instead of methanol and such a mix is ideal for with gasoline because the higher alcohols preve tion of the blend through inadvertant presence

Methanol to olefines, MTO, is soon likely to mercial as an altenative to MTG. Formaldehyde & anol can be carbonylated to glycolic acid and th to ethoxymethylene malonic esters. Formaldehy reductively carbonylated to ethylene glycol, one of approaches to this important chemical from syn

Ethylene Glycol

Syngas route to ethylene glycol is receiving attention and it may soon emerge as a commerci sition when price of ethylene goes up to a Dollar level. It is an attractive proposition due to the hig content. But, the two carbon chain is not easy to from $CO + H_2$ and many indirect ways are requir are a few at various stages of R & D.

I) From methanol and formaldehyde (of Celan radical initiated condensation using t-butyl hydr wherein t-butyl alcohol is formed and can be m

$$_2OH + HCHO \dashrightarrow CH_2OH.CH_2O$$

$$_2OH.CH_2O + CH_3OH \dashrightarrow CH_2OH.CH_2 + CH_2OH$$

rect carbonylation of formaldehyde (of Chevron) ofluoric acid is used as catalyst and solvent to yield acid which is esterified by ethylene glycol itself drogenated to double the quantity of glycol — half e.

$$CHO + CO = H_2O \longrightarrow HO.CH_2.COOH \xrightarrow{H_2} HOCH_2.CH_2OH$$

Direct conversion of syngas using rhodium catalyst nion Carbide) is near success and will be the lowest v material cost and avoids the two intermediates of nol and formaldehyde.

this context it is necessary to note an elegant process oped by Scientific Design Co., (Halcon) for MEG from ene without going through the oxide. This Halcon pro- produces a mixture of monohydroxy acetates and dia- es using a catalyst system of acetic acid solution of rium dioxide and hydrogen bromide. This gives high tivity of over 95% to the ethylene glycol acetates under conditions–

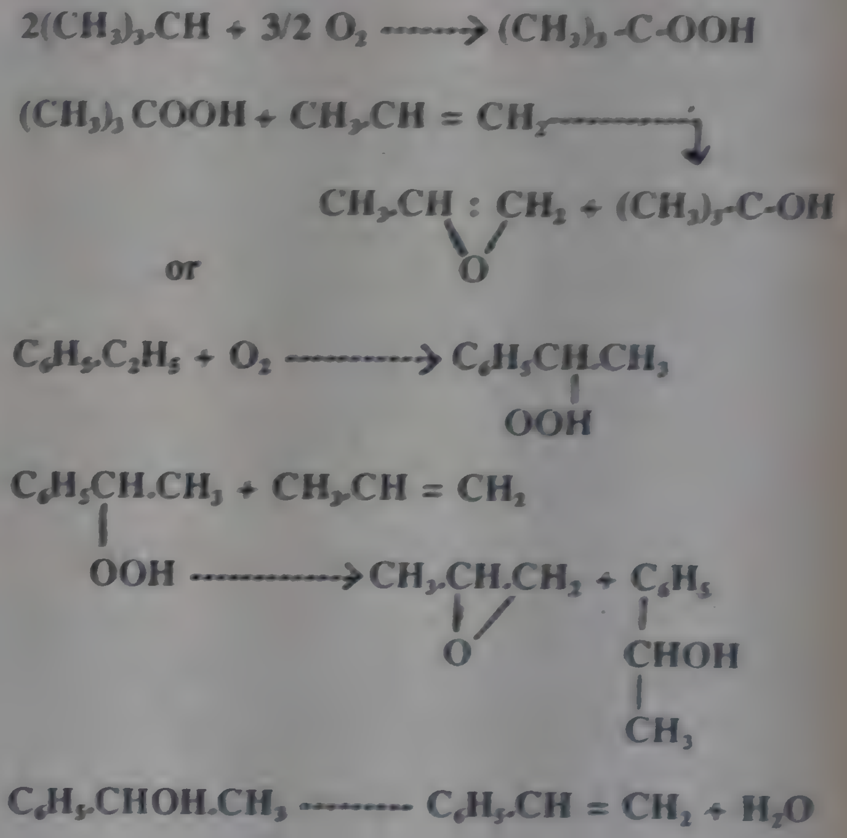
$$CH_2 = CH_2 + CH_3COOH + 1/2\,O_2 \xrightarrow[Te]{Br^-} ACO\text{-}CH_2.CH_2OAc + H_2O$$

$$[Ac = CH_3CO]$$

he acetates are hydrolysed to yield MEG and acetic acid recycle. The mechanism of this reaction is not clearly wn but, it is said to be analogous to the Wacker ace- ehyde synthesis from ethylene. The Oxymetallation by V) of ethylene in the presence of acetic acid leads to iacetate. The process is suitable for smaller capacity s for MEG and yields on ethylene are higher when pared to the oxidation of ethylene to ethylene oxide e yields seldom exceed 70%.

ane Process for Propylene Oxide

ropylene Oxidation to the epoxide directly by air or gen is not satisfactory and hence, the conventional pro- in use goes via chlorhydrin. However, an outstanding ess of recent years is the indirect oxidation of propy- to the propylene oxide through the agency of alkly peroxides. This oxygen transfer to propylene is catalysed by a soluble molybdenum containing salt. The u of tert butyl hydroperoxide was reported as early as 196 but, it is the SD/Oxirane group who have fully develope this process to a top place in the commercial productio of propylene oxide in several plants in USA and Europe. The oxygen transfer results in t butyl alcohol which can be converted back to isobutylene or more recently finds a ready use for conversion to MTBE. An alternative to t-butyl hydroperoxide is Ethyl benzene hydroperoxide which leads to phenyl ethyl alcohol as coproduct which is then readily converted to styrene by dehydration. Thus, coproduction of styrene and PO or MTBE and PO are the most successful projects of recent years. The reaction sequences are presented below:



$$2(CH_3)_3.CH + 3/2\,O_2 \dashrightarrow (CH_3)_3\text{-}C\text{-}OOH$$

$$(CH_3)_3COOH + CH_3.CH = CH_2 \dashrightarrow \underset{\diagdown O \diagup}{CH_3.CH : CH_2} + (CH_3)_3\text{-}C\text{-}OH$$

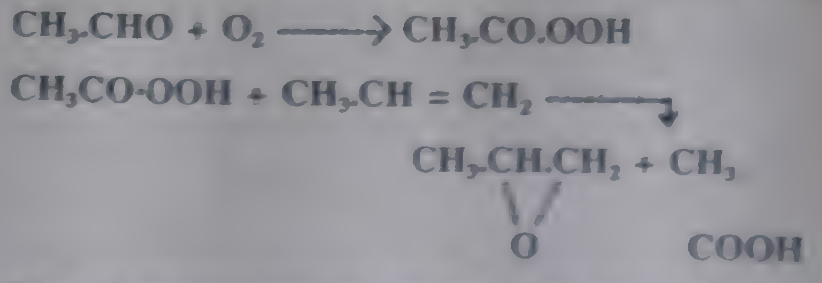
or

$$C_6H_5.C_2H_5 + O_2 \dashrightarrow C_6H_5\underset{\displaystyle OOH}{\underset{|}{CH}}.CH_3$$

$$C_6H_5\underset{\displaystyle OOH}{\underset{|}{CH}}.CH_3 + CH_3.CH = CH_2 \dashrightarrow \underset{\diagdown O \diagup}{CH_3.CH.CH_2} + \begin{array}{c}C_6H_5\\|\\CHOH\\|\\CH_3\end{array}$$

$$C_6H_5.CHOH.CH_3 \cdots\cdots C_6H_5.CH = CH_2 + H_2O$$

There is also a successful process for propylene oxide using peraacetic acid which has been developed and is used by Daicel in Japan. Acetaldehyde is oxidised by air to form peraacetic acid in 25% concentration solution (as this is a hazardous chemical). The peraacetic solution is then reacted with propylene at 50 to 80°C and 10 atm. pressure yielding 90 to 92% as propylene oxide and acetic acid. The acetic acid is a coproduct of this process as per reactions below:

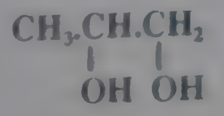


$$CH_3.CHO + O_2 \longrightarrow CH_3.CO.OOH$$

$$CH_3CO\text{-}OOH + CH_3.CH = CH_2 \longrightarrow \underset{\diagdown O \diagup}{CH_3.CH.CH_2} + \begin{array}{c}CH_3\\ \\COOH\end{array}$$

There is another process for propylene glycol from propylene by a single step reaction reported by Exxon Chemical with selectivity claims of 99%. The catalyst system is said to be a noble metal and a first row transition element — typically Osmium tetroxide with copper bromide as co-catalyst. Polar organic solvents miscible with water are the medium –

$$CH_3.CH = CH_2 + 1/2\ O_2 + H_2O \xrightarrow[\text{Promoter}]{\text{Cat/CoCat}}$$


$$\underset{\text{OH}}{CH_3.CH}.\underset{\text{OH}}{CH_2}$$

The process is yet to be commercialised.

Styrene Via Carbonylation

The well established process for styrene is by dehydrogenation of ethyl benzene made by alkylation of benzene with ethylene. The alternative via the peroxide of ethyl benzene with propylene oxide as co-product has also been referred to earlier. There are also developments for styrene and aromatic acids through carbonylation of the methyl side chain of toluene. Monsanto have been active in using zeolites containing cesium and boron.

$$CH_3OH + C_6H_5.CH_3 + 1/2\ O_2 \dashrightarrow C_6H_5.CH_2.CH_2OH$$

$$C_6H_5CH_2.CH_2OH \dashrightarrow C_6H_5\ CH = CH_2 + H_2O$$

Toluene and methanol are cheaper than benzene and ethylene if yields are comparable. Also phenyl ethanol (benzyl alcohol) can be carbonylated and then dehydrated to styrene.

$$C_6H_5\ CH_2OH{+}CO{+}2H_2 \dashrightarrow C_6H_5CH_2CH_2OH + H_2O$$

A combination of CuC_{12} and Sodium Iodide is used as catalyst. These alternatives are yet to be finally evaluated but show promise.

Liquid Phase Methanol Process

Methanol from natural gas via steam reforming and synthesis at medium pressure is the standard practice but, there are claims for a lower cost route based on liquid phase reaction from the Brookhaven National Laboratories of U.S.A. The key to the process is a new catalyst described as a liquid solution active at even 100°C and the removal and recovery of heat. The natural gas is also reformed by air instead of steam and the nitrogen does not affect process conversion. The reformed gases are sparged at elevated pressures through the reactor containing catalyst solution which is circulated through a cooler system. Conversion is said to be over 90% so that recycle of unconverted gases is avoi
This new approach is claimed to cut investments by
35%.

Carboxylic acids from syngas

Syngas is the base for the new acetic acid (via me
nol) and the production of short chain acids of C_1 to
is estimated at 1.5 to 2 million tonnes in U.S.A. Apart f
use as such, they are converted to esters, solvents, syn
tic lubricants, monomers like vinyl acetate and vinyl
pionate etc. A new process of Texaco Chemical Co. cla
production through homologation of acetic acid by syn
in the presence of Ruthenium catalyst with iodine cont
ing promoter. As acetic acid is also made from syngas
methanol, a combined reaction is also possible.

$$CH_3\ COOH \xrightarrow[CO/H_2]{} Cn\ H_{2N+1}COOH$$

Yields of C_3 + acids from acetic acid are claimed to
over 45% with varying ratios of C_3, C_4 and C_5 depend
on catalyst composition. The preferred conditions are s
to be 220°C and 400 atm. but, rates of reaction are sl
though conversions of 95% of acetic acid to the higher a
is claimed. However, commercial use is yet to be made
perhaps some snags are there.

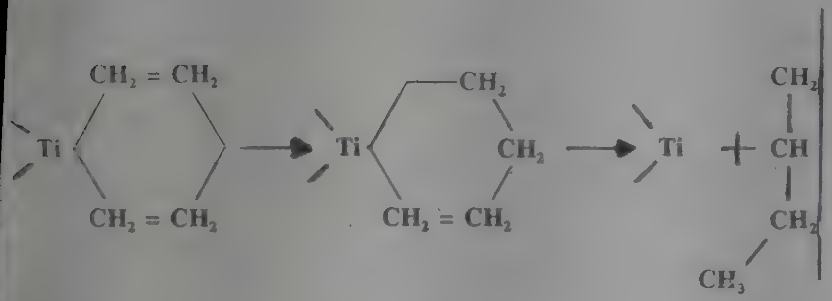
Interconversion of Olefines

We have looked at the shifts in basic feedstocks for
fines and more particularly the progress and potentia
a shift to syngas (C_1 Chemicals) as also the greater us
ethane and other lower ends of LNG. This shift away fr
the earlier concept of naphtha cracking with a range of
fines, dienes and also aromatics and the need for an equ
wide spectrum of products from these in a petrochemi
complex may assume more importance in the coming ye
Also, the greater impact of feedstock and energy costs
the product with less relevance of capital related costs, h
reduced the importance of going to bigger and bigger cap
ities. The need for conversion of heavy ends of petrole
refining to lighter fuels which are required in increas
quantities results in more by-product olefines, particula
C_3 and C_4, which could be tapped for products. The lar
availability of LNG has also led to the possibility of p
pane and butane being fractionated out for conversion
olefines and products in a small and limited "non-comple
operation. The imbalance between specific olefines and p
ducts derived from them has led to inter-conversion of
olefine to another -- surplus of one being used to meet def
of another. Some of the processes developed in this co

erred to below. The concept is not new for Phillips um which had a "Triolefines" process for intercon- n but, this did not prove of importance in the earlier t.

ne-1 from Ethylene

e French Institute of Petroleum have an elegant pro- for dimerisation of ethylene to butene-1 called Alphab- process. A special catalyst is used in the liquid phase isomerisation of butene-1 to butene-2 is avoided. The lyst is based on titanium in the mechanism illustrated w:



Butene-1 can also react further with ethylene to give exene, but, at much lower rates and this is restricted by odifiers in the catalyst. Apart from the use of butene as ch for derivatives, it can be readily converted to buta- ene which is increasingly in short supply.

ropylene from Ethylene

Propylene is the most valuable coproduct of ethylene in aphtha cracking which however, is receding into the back- round. Prices of propylene and ethylene are usually djusted in relation to demand but, when ethane is cracked ethylene, there is little recoverable propylene. But, just s ethylene can be converted into butene-1, it can also be onverted to propylene by "disproportionation" with but- nes. This original "Triols" process of Phillips Petroleum s now developed by Arco and others though not yet per- aps, commercially used.

A more important development is of direct dehydroge- ation of propane to propylene. UOP have such a process in a specially designed reactor with provisions for contin- uous catalyst withdrawal, regeneration and feedback. Air Products is more advanced in this field with the Houdry Dehydrogenation process for butane being extended for pro- pane to propylene under the name Catafin. It is equally applicable to butane dehydrogenation. The price differen- tial between propane and propylene has to be above 8 cents/lb to pay for the conversion. UOP process is to be used in a plant in Thailand while Catafin will be used in Mexico.

Aromatics

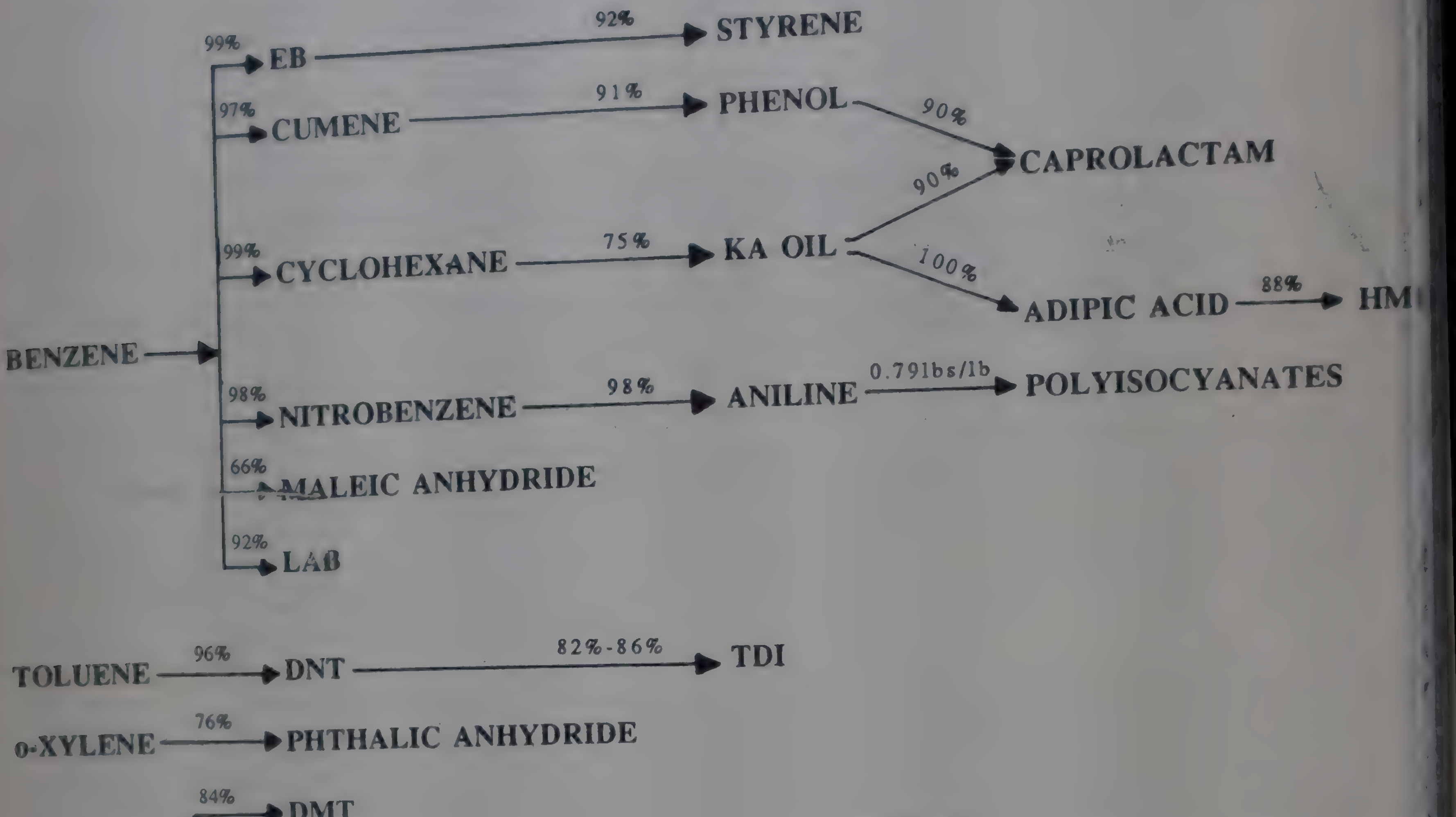
The two major pathways to chemicals considered so far are synthesis gas (and methanol) and olefines. The third equally important branch is of aromatics particulrly BTX — benzene, toluene and xylenes. These arise from corresponding pre-cursors of C_6 to C_9 range derived as cuts of naphtha and platforming (or reforming with Platinum based Catalyst) to the aromatics by cyclisation, dehydrogenation, dealkylation and other ireactions. In the case of xylene the separation of isomers is very important and several processes of physical separation are available. Paraxylene is the most important isomer with lesser usage of o-Xylene. The third meta isomer can be converted to the para/ortho isomer for maximising their production. Toluene is the less useful of the three and in larger supply used mainly for gasoline blend. But, toluene is also dealkylated to benzene if price differential is attractive. Most important of the derivatives of the BTX are oxidation compounds, phthalic anhydride from o-Xylene and terephthalic acid or its dimethyl ester from p-Xylene. Toluene is oxidised to benzoic acid which is one of the ways to phenol and the diamine of toluene is an important intermediate for TDI used for polyurethanes. Benzene is hydrogenated to cyclohexane and then oxidised to the cyclohexanol/cyclohexanone mixture for conversion to caprolactam (for polyamide-6). Benzene is also oxidised to adipic acid which is in turn used for polyamide 6-6.

There are a few shifts in the processes at various stages but, the most important shift in recent years is the development and use of Terephthalic acid for direct esterification with MEG to polyester instead of via DMT and trans esterification. Benzene is the base for styrene and some changes in the process to use toluene/syngas were referred to. Benzene is also used for maleic anhydride but, it is being displaced by butanes. Phenol and Alkyl benzene for detergents are other benzene derivatives. A chart of the major BTX derivatives with the level of conversion in available process is at Fig. 1 and a summary of the status of technology for different products is at Fig. 2 (Both on page 54). It is proposed to refer only to a few specific process developments briefly.

Aromatics from Light Hydrocarbons

The shift to natural gas for cracking, the need to blend more aromatics in gasoline to raise octane and the long-term uncertainty of petroleum supplies have generated interest in converting light aliphatics into aromatics. A process developed by Kinetic Technology in association with some Belgium Laboratories is of potential value. The 'Pyroform"

Figure 1


BENZENE
99%
EB
92%
STYRENE
97%
CUMENE
91%
PHENOL
90%
CAPROLACTAM
90%
99%
CYCLOHEXANE
75%
KA OIL
100%
ADIPIC ACID
88%
HM
98%
NITROBENZENE
98%
ANILINE
0.79lbs/lb
POLYISOCYANATES
66%
MALEIC ANHYDRIDE
92%
LAB
TOLUENE
96%
DNT
82%-86%
TDI
o-XYLENE
76%
PHTHALIC ANHYDRIDE
p-XYLENE
84%
DMT
88%
TPA

NOTES:

* Includes upgrading of Ka Oil by-product

All-percents are molar yields.

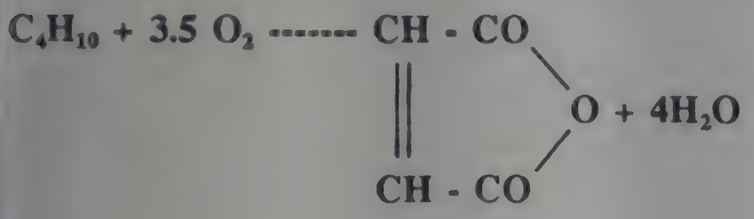
Figure 2

Product	Development Cited	Comments
Styrene	Toluene-Based Routes Show Potential	Toluene and synthesis gas are the raw materia Pre-pilot stage.
Phenol/Caprolactam	Vapor-Phase Benzoic Oxidation	Doubtful economics.
	Cyclohexylbenzene Oxidation	Renewed activity. Implementation would reduc benzene consumed.
Adipic Acid	Butadiene Carbonylation	Economic trends favour this approach.
HMDA	None	All new capacity is already non-aromatic.
Aniline/Polyisocyanates	Nitrobenzene Carbonylation	This route requires up to +7 more benzen relative to present use.
Maleic Anhydride	Butane/Butene Oxidation	Economic and technical trends should be towa elimination of new benzene based units.
TDI	Dinitrotoluene Carbonylation	No change in toluene usage
PAN	Liquid-Phase Oxidation	If implemented, it requires 15% less o-xylene.
TPA	Toluene Carbonylation Route	Substitutes toluene for p-xylene.

ss gives aromatics jointly with olefines from ethane, ane or mixtures thereof. The process can be either ther- or thermal/catalytic. The basis of such production is same as associated aromatics production of naphtha king. The process in effect reforms olefines in the ence of alkanes through cracking, thermal reformin separation. About 10% by weight of feed ends up as matics. Typical conditions are 723 to 823°K and 1 to atm pressure. Overall yields with recycle can be 45 to % of feed and a unit for 1,50,000 TPA of crude aro- tics from propane is estimated to cost $ 97 million for rmal + catalytic pyroforming.

aleic Anhydride from Butane

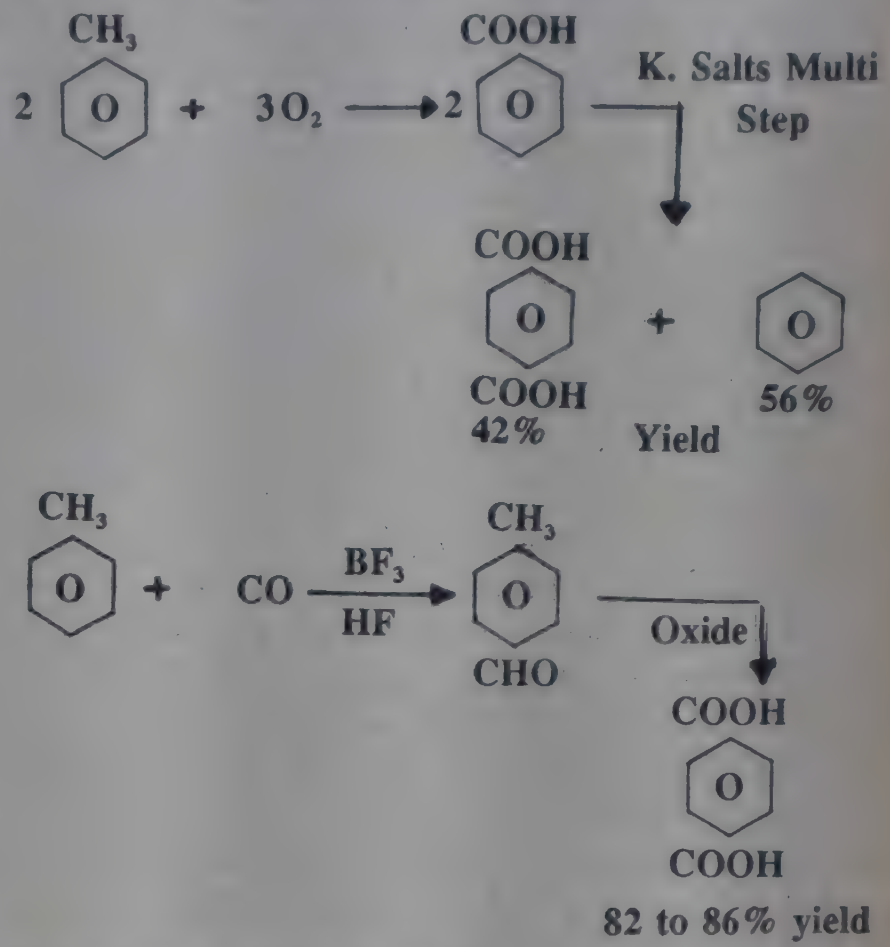
The existing capacity for MA is mainly based on ben- ne but, most new capacity is based on butane oxidation.



Butanes are cheaper than benzene and a mixtu utanes can also be used. Alusuisse Italia, have switched ver to butanes in their existing plant. Oxygen needed is ower and overall operating costs are lower. Catalyst is a roprietory one based on Vanadium-Phosphorus complex nd lasts over 30 months. Reactor is of molten salt cooling ype with recovery of steam at high temperature and pres- ure. Investment on a new 30,000 TPA plant in U.S.A. was stimated at $17.65 million in 1982 — about 12% lower han on benzene. Butane requirements are expected to reach onne/tonne of product.

Toluene to TPA

As mentioned earlier, toluene is more plentiful than paraxylene and efforts on using toluene as a substitute for producing chemicals that are based on p-xylene or on benzene are always pursued vigorously. Toluene can be converted to benzene and Xylenes by methane exchange but this provides only the starting materials. Toluene to benzoic acid by air oxidation is well organised and potassium benzoate can be converted into Terephthalate and benzene by the COOH transfer (Henkel process). This has been tried out by Phillips Petroleum and Rhone Poluenc, but, has not reached commercial stage. Mitsubishi Gas Chemical have a different approach — to carbonylate toluene to get meta-tolu-aldehyde which is then oxidised to TPA. Problems of impurities such as ortho product arise and have yet to be overcome. But, the future for this process looks to be one of promise. The reactions are illustrated below:



Isocyanates by Carbonylation

Aniline and Toluene Diamines are the base for isocyanates. Toluene for example, goes through the first stage of dinitrotoluenes, then reduction with hydrogen to diamine which is reacted with phosgene to give TDI and hydrochloric acid. Aniline from Phenol instead of nitrobenzene is also in use and perhaps even by the amination of chlorobenzene. Now Arco have been active in R & D on MDI from benzene without going through Nitration and reduction and also avoiding the hazards of phosgene. Mitsui Toatsu have reportedly succeeded in making TDI from dinitrotoluene by carbonylation/reduction of NO_2 groups without the need for hydrogen or phosgene. Du Pont have reportedly a process of reacting benzene directly with ammonia to aniline in the presence of nickel oxide. All these altenatives to the use of phosgene to make isocyanates are still in an uncertain state and not ready for commercial use. But, there is perhaps no doubt that one of these approaches will soon be completed and be ready to displace phosgene for isocyanates.

Soda ask with VCM Co-Product

AKZO of Netherland claim to have a technology which breaks new ground — making EDC, the precursor to vinyl chloride directly from salt without going through chlorine. Electrolysis and energy for it are avoided. A catalyst system using Trimethylamine hydrochloride, Iodine and Cupric chloride in adiponitrile as solvent is used. It absorbs ethylene under pressure resulting in iodo, chlorination of Ethylene to EDC which is then stripped off by carbon dioxide and purified for conversion to VCM by dehydrochlorination. The catalyst fluid is separately oxidised in a special reactor where trimethylamine is removed by CO_2 and then converted into the hydrochloride for reuse. The carbon dioxide is treated for recovery of trimethylamine as a concentrated solution which on reaction with salt in a crystalliser forms soda ash and the amine left for recycle. There are good prospects for this if the losses at various stages are minimal.

MTBE

It was mentioned earlier that MTBE is one new chemical which has risen fast for use in gasoline. The process is simple from methanol and isobutylene in a special resin-based esterifier. But, the process improvements have come up every year and the latest is to make MTBE from the C_4 stream of naphtha cracker even before removal of butadiene, as per Snam Progetti. For higher level of isobutylene the cracking has to be of less severity, when butadines is also low. But, typical medium severity cracking gives a C_4 stream of 16% butene-1, 6.5% butenes-2, 27% isobutene, 37% butadine. The reaction conditions with methanol were specially worked out to keep butadine unaffected. An acidic catalyst was used. The product MTBE was over 99% pure and the spent C_4 stream contained higher concentration of 50 to 60% butadiene due to the removal of isobutylene. The recovery cost for butadine is thus also lowered. The process is in operation.

Catalysts for Polyolefines

The last decade has witnessed remarkable improvements in the processes for polyolefines apart from the new grade of Linear Low Density polyethylene. The Ziegler Natta catalysts of group IV — VIII transition metals and group I — III inorganic metal compounds are a major breakthrough. Magnesium chloride supported titanium catalyst system with Aluminium has shown remarkably high activity both in rate and stereo specificity of polymers. The new processes for LLDPE and relative performance levels are indicated in Table I on page 57. The improvements have been so remarkable that the removal of catalyst residues has become unnecessary. Different comonomers — butene, hexene or octene are use for varying polymer properties. Union Carbide now claims production of HDPE or Polypropylene in the same plant. It is possible that we have reached the peak in catalysts for olefine polymerisation.

Methyl Methacrylate

Methyl Methacrylate is made from acetone and
gen cyanide since decades. Hydrogen cyanide as a
duct of acrylonitrile process for ammoxidation of pro
has helped sustain this process but increasing publi
cern with safety and rising costs have led to alter
routes to MMA. It is possible to use ethylene, pro
or isobutylene but, probably the last one is preferable
ylene by oxo process yields propionaldehyde which
condensed with formaldehyde and dehydrated to
methacrolein or alternately propionic acid can be con
to methyl ester and condensed with formaldehyde
MMA. Isobutene yields t-butyl alcohol in the Oxiran
cess referred to earlier, which can be converted to m
rolein and then the acid and MMA. A recent asses
of various alternatives to MMA and costs are given
These are based on assumed prices of:

Ethylene	-	16.0
Carbon monoxide	-	6.0
Methanol	-	6.5
Formaldehyde	-	11.0
Propylene	-	18.0
Acetone	-	17.0
Methane for HCN	-	10.0
Ammonia	-	7.0
Sulphuric acid	-	2.3

Although the present large producers use the A
ne/HCN route the shift will take over in the coming
most likely to propylene. A comparative analysis of
processes of manufacture of MMA is carried out in
II on page 57.

Alpha Olefines

Linear alkyl benzene is the backbone of the syn
detergent industry. The alkyl fraction is a straight chai
fine of C_4 to C_{12} chain length derived from a kerose
middle distillate cut which is dehydrogenated to the
fine by special catalyst. The dehydrogenation can al
by chlorination and dehydrochlorination, a process
has been relegated to the background. Recent pr
improvements of UOP who are the top in the field
increased the yields and cut down on unwanted bypro

But, what has emerged as an important intermedi
detergents are the alpha olefines of C_{10} to C_{12} chain
and their use after direct sulfonation or via the
These surfactants have special functions for liquid
gents and are reported to be growing at a high rate.

to use benzene is avoided and ethylene is the base, xtending the range of products for which ethylene is in place of others. The alpha olefines process yields ge in chain length from C_4 to C_{16} and recent devel- ents provide market for the full range of products , to C_8 as comonomers for polyolefines, C_{10} to C_{12} for actants and higher olefines for lubricant additives, syn- ic lubricants etc. This addition to the group of ethylene vatives is an importatnt recent development.

he shifting technologies for petrochemicals have been veyed briefly and this is certainly not exhaustive but, only icative to reflect the trends. The feedstock picture anges depending on various factors, some of them polit- l and some economical and the choice of local raw mater- in preference to import dependence on petroluem oducts. This explains the resurgence of methanol and eth- ol for some products.

There is intense activity in getting methane "activated" yield ethylene or such a reactive intermediate. This is a good and more viable alternative than going via synthesis gas or methanol discussed earlier. Some success is reported on getting about 45% of methane converted into C_2 with about half as ethylene and balance as ethane —which of course can be separately converted. The direct use of methane and the ways of converting ethylene into a wider range of products is likely to take shape in the coming years.

The shift to coal or biomass is not likely in the near future except in isolated cases. The trends shows that we do not have to plan in terms of giant complexes of large capacities. Many products are raw material intensive in costs and the economies of scale are less important than they were in the sixties and seventies. Integration with refinery operations for a small range of starting materials is essential. India has aromatics rich petroleum and fairly abundant gas resources in addition to a ready source of ethanol from the sugar industry byproduct. There is much opportunitiy for selection of technology in relation to our sources and needs and also plan for R & D areas in this context.

Table - I

New Processes for LLDPE and relative performance levels

rocess	Company	Pressure Kg/CM²	Temperature °C	Comonomer	Plant Cost $ mill.	Product Cost $/tonne
as Phase	UCC	21	95	Butene	31.7	579
lurry	Phillips	32	95	Butene	N.A.	N.A.
lurry	Showa Denko	?	?	Hexene	N.A.	N.A.
igh Pressure	CdF	1400	200	Butene	33.7	628
olution	Mitsui	28-42	200-230	Butene, Hexene or Octene	33.7	628
High Pressure		1000-3000	200-300		72.3	736

(Product Cost based on same pricing of ethylene)

Table - II

Comparative analysis of various process of MMA manufacture

(MMA at 300 mill. lb/year)

ources & Process	C_2H_4 via Propionaldehyde	Propylene via isobutyaldehyde	Isobutylene via methacrolein	Acetone HCN from methane
Investment $ mill.	95	96	90	125
Costs net for r. m. c/lb	20	19	25	20
Utilities	14	8	2	6
Depreciation, Interest and ROI	9	9	9	12
Total c/lb	46	39	39	41

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OVER A DECADE OF DEVOTED SERVICE TO THE CHEMICAL/ALLIED INDUSTRIES

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India, despite having the third largest scientific man-power, still lacks in technological development in vital sectors of the chemical industry. The author has identified the key areas of the industry for future development and very strongly advocates the total ban on know-how purchase from abroad. He feels that the important processes should be simulated, optimised and future plants should be entirely designed on the basis of local expertise.

Technological Capability of Indian Chemical Industry: Sectors involving Organic Chemical Processes

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This paper deals with a few sectors involving organic hemical processes, and broadly reviews the opportunities vailable and the challenges faced by the country. While ommenting on the overall technological capability, an ttempt has been made to analyse the underlying causes r the apparently poor performance of the industry in the ealm of technological self-reliance.

NTRODUCTION

This paper focuses on the technological capability of various sectors of chemical industry such as those manufacturing petrochemicals, petroleum products, plastics, lastomers, synthetic fibres, solvents, coating materials, dyes, pesticides, pharmaceuticals and many other specialty chemicals. The scale of operation varies from a million onnes per year in some cases to a few hundred tonnes per nnum in the case of some fine chemicals. The technology n most of these cases originates from a new concept of product or process, which is translated from laboratory to a commercial plant by a series of steps, which may be looked upon as a 'chain of innovation'. Laboratory research, even where most relevant, provides only the starting point. The subsequent development with or without pilot plant followed by basic design, detailed engineering and market research and development invariably demand far more financial resources and time. The chain of innovation is not completed till the technology is fully assimilated and the product is successfully marketed. In the chain of innovation, the key steps of Research, Development and Design call for the services of scientists and technologists of very high calibre. In India, we have the third largest scientific manpower. However, most of the science graduates churned out of our Universities are incapable of assimilating and generating new knowledge and cannot be counted for the development and absorption of technology, though they may be gainfully employed in the routine jobs of production, quality control, maintenance and marketing.

The Government of India has established a vast network of National and Regional Laboratories under the control of Council of Scientific and Industrial Research and has promoted in-house R and D in the industry. The Department of Science and Technology has recognised many in-house R and D centres, and a number of fiscal, financial and other incentives are offered. The number of R and D units and the money they spend have grown considerably over the last four decades, after Independence. However, even-today, a very small percentage of turn-over is spent on R and D activities. Further, more than 90% of this is in the public sector. What is more depressing is the fact that top industrial leadership is sceptic of the adequacy of the R and D work carried out by CSIR Laboratories. Similarly in-house R and D is generally not accorded high status in the corporate sector. There are poor or no linkages with design and marketing groups. In general, therefore, the goal of building up an autonomous technological capability for achieving technological self-reliance is not being realised. This paper discusses these issues with specific reference to a few chemical sectors involving organic chemical processes.

LARGE VOLUME CHEMICALS

Petrochemicals

Organic chemical processes are widely used in the manufacture of petrochemicals which are the building blocks for the production of synthetic fibres, plastics, elastomers, etc. Olefins are at present produced on a substantial scale in India from naphtha. New plant capacities are being set up based on the associated gas from Bombay High. The key step involved in the production of ethylene and other olefins is steam cracking of naphtha or associated gas. The basic process know-how is obtained from abroad and repetitive purchase of know-how is the recurring feature in India and other developed countries. Apart from olefins, other petrochemicals are aromatics, including benzene, toluene and xylenes known as BTX. These are obtained by hydroforming of naphtha and also as by-products from the steam cracking of naphtha. In the future, as we shift to associated gas for the production of ethylene, the aromatics would not be available as by-products. Fortunately, Bombay High Crude is light and rich in aromatics and provides naphtha ideally suited for manufacture of BTX aromatics. Thus, we should develop basic capacities in the development and design of hydroforming of naphtha and optimise the process with respect to Indian crude. We should establish plant capacities for BTX for growing domestic market as well as exports.

Synthetic Fibres

There is an urgent need in India to divert a substantial percentage of land from cotton to other crops. India continues to import edible oils worth more than one billion dollars. Hence, a need for allocating more land for such purposes is obvious. Among the synthetic fibres, polyester fibre would have the highest growth rate. The key raw materials for polyester fibre are terephthalic acid and ethylene glycol. The former is made from p-xylene by the liquid phase oxidation with air.

Till recently, methyl ester of terephthalic acid, viz. D.M.T. was employed. However, new plants have already shifted to pure terephthalic acid and in the future most of the plants would be based on pure terephthalic acid instead of D.M.T. The plant capacity being planned at present is about 0.1 million tonnes which is quite reasonable. The technology, however, is based on imports. It is expected that in the near future, India would be self sufficient in this respect. Ethylene glycol, another raw material is obtained by the vapour phase oxidation of ethylene to ethylene oxide followed by the hydrolysis of ethylene oxide.

Plastics and Elastomers

There is substantial growth expected in these sectors. The monomer for poly vinyl chloride is being made from ethylene via ethylene chloride (ie. 1,2-dichloro ethane). The future plants would employ this approach. Some old plants are based on acetylene via calcium carbide but these are not relevant in the future. The major problem in the process using ethylene is the generation of hydrogen chloride during the conversion of 1,2-dichloro ethane to vinyl chloride. If oxidative chlorination is employed using ethy and hydrogen chloride gas to make 1,2-dichloro ethane. problem can be solved. The process is fairly well kn and future plants should consider this possibility.

In the case of vinyl acetate, a monomer for poly v acetate and poly vinyl alcohol, India has two plants rece established on the basis of entirely different approaches. of these plants makes ethylidene diacetate by reacting a anhydride and acetaldehyde and the former on crac gives vinyl acetate. The other plant is based on the va phase acetoxylation of ethylene with oxygen and acetic The former route is alcohol based while the latter is pe eum based.

Elastomers have a good future because of the grow automobiles. Butadiene required for S.B.R. is obtaine a byproduct from naphtha crackers. In the future, other fins will be obtained from gas cracking. However, kee in view the need for butadiene, we should install pl based on naphtha cracking. It may also be made by a n route.

Detergents and Soaps

The linear alkyl benzene used for biodegradable d gents is made available from kerosene fraction. We sh also adopt alpha-olefin sulphonates in a big way. Alpha fins could be based on ethylene. Synthetic fatty alc ethoxylates are also expected to become important. research on such processes should be initiated, while emphasising the growth of soap. For the existing need fatty acids for soap, the liquid phase oxidation of par wax by air should be practiced.

Petroleum Products

The refining capacity in the country is expanding stantially. As mentioned earlier, the Bombay High cr are rich in aromatics. Therefore, for the production of osene fraction for aviation turbine fuel or for illumina new technologies should be developed and altern options based on extraction and hydroprocessing shou considered.

For maximising production of middle distillates (sene and diesel) which will continue to be in short su hydrocrackers will have to be designed. Here also, new alysts and new designs will have to be considered fo objective of optimising the production of kerosene diesel, which is different from that of maximisation of m gasoline.

IUM AND LOW VOLUME CHEMICALS

hile we are not self-reliant in the know-how and tech- gy for the above mentioned bulk chemicals, the sit- on is radically different when we turn our attention to eral diversified chemicals needed by medium and small e industries.

n the last decade, chemists and technologists in this coun- have made a remarkable progress in the area of process velopment for dyestuffs, pesticides, pharmaceutical chem- als and their intermediates. Most of these products need ultiple step synthesis and high degree of innovation.

The multinational companies have claimed that such chnologies are very complex. The Indian Sector, how- ver, met the challenges successfully by developing these o-called high technologies in a very short period. Not only e performance was comparable to the best, but in many ases it surpassed the claims of multinationals. This hap- ened in the case of synthetic pyrethroids and their inter- nediates. The same story was repeated in the case of many drugs and dyestuffs. The processes involved are generally carried out in a batch manner. This is another feature of these chemicals, which is in favour of India.

It is expected that in the future, we shall take maximum advantage of our inherent strength in this area. We should increasingly undertake the development and production of high priced, low volume chemicals and export the same to our advantage. It is realised that the cost structure of chemicals in India is not very encouraging. Most of the basic or bulk organic chemicals are high priced because of higher cost of starting raw materials and because of relatively smaller size of our plants. Thus, we cannot face international competition without giving excessive protection to our indigenous industry. Unlike these bulk organic chemicals, as we go to chemicals involving high cost and low volume, the cost structure is more favourable to India, inspite of the higher cost of starting bulk chemicals. This is mainly because of the multiple steps involved, labour intensive operations and batch processes, lower wage bill of scientists and technologists, and relatively less effect of economy of scale on the cost structure.

The Indian Patent Act, 1970 has also been very helpful in promoting these developments. Thus, substantial growth is expected in the area of intermediates for plastics, rubbers, pesticides, drugs etc. for domestic consumption and for exports. This will also increase the Indian capability in the realm of process development for complex organic processes involving intense input of chemistry.

ALTERNATIVE FEED STOCKS & TECHNOLOGIES

Due to the ever rising prices of crude petroleum and the depletion of proven sources, there is a distinct and obvious trend to base the manufacture of organic chemicals on alternative feedstocks. However, for the next 15 years, the chemical industry will continue to depend on petroleum and associated gas. Another feedstock, viz., ethyl alcohol would continue to play a significant role. In the distant future, however, the chemical industry would have to shift to coal as the starting material. Synthesis gas derived from coal can be converted to methanol which gives a wide variety of chemicals. Considerable work has already been carried out in this area known as C_1-Chemistry. Methanol can be converted to lower olefins and aromatics by using shape selective zeolites.

Another area of great potential is bio-technology. Chemical engineers would be expected to increasingly associate with others in this area of research. However, it is doubtful whether technology for production of any bulk chemical will become important excepting alcohol by fermentation, where we hopefully would improve our processes in a major way. For example, pharmaceutical industry will be the major beneficiary. Synthetic insulin may emerge as one of the successful ventures.

MAJOR STRATEGIES IN THE FUTURE

In the future more efforts would be placed on the development of alternative processes for the production of existing chemicals. Major strategies would be dictated by the following factors: (i) ever rising cost of feed stock and energy, (ii) more stringent laws for pollution control, and (iii) environmental safety. With the better understanding of chemistry involved and the mode of catalytic action in many cases, it may be possible to devise a better process version and minimise the formation of by-products. Research in catalysis may play a key role. Shape selective catalysts, enzymes etc. would be increasingly considered. Similarly, attempts would be made to profitably utilise the byproducts or convert them back to starting materials. For example, in sulphonation the undesired sulphuric acid may be desulphonated by hydrolysis. In the case of nitration by mixed acids, dilute sulphuric acid is produced. It may be possible to resort to nitration by nitric acid alone and solve the problem.

In order to minimise the pollutants in the waste streams, these may be recovered and converted to useful products. This would eventually pay the cost of recovery and convert a liability into an asset. Apart from minimising the discharge of chemicals in the waste stream, it is necessary to develop better methods for pollution abatement. Intense research activity is expected in this area. What is more important is that the choice of technology may be dictated by the pollution problems encountered. For example, hydrogenation of nitro-compounds in the presence of noble metal catalyst may be preferred to reduction by iron-acid or sodium sulphide because the former process is free from pollution problems.

Some of the intermediates for dyestuffs are posing pollution problems, which are defying solutions. The manufacture of these products is being abandoned by foreign countries. This apparently provides an opportunity for India to manufacture and export these products. However, this tendency should be discouraged since it amounts to bringing pollution at our door-steps. Only when the pollution problems are resolved, the manufacture of such items may be undertaken.

Another problem of vital importance relates to environmental safety. In process development risk-analysis, Hazard and Operability study etc. would be carried out to ensure that the process is intrinsically safe and reliable. Whenever highly toxic and reactive chemicals are involved, alternative process strategies may be suggested and developed and new plants may be based on these alternatives, even when the cost of production is relatively higher. Whenever, highly hazardous chemicals are involved, continuous mode of operation may be developed even when the scale of operation is small, because the inventory of chemicals is minimum in a continuous process. The detoxification of toxic chemicals discharged in the waste stream is like any other chemical process except that the concentration is at ppm. level. More work in this area is obvious for the existing and new processes.

ENVIRONMENTAL IMPACT ASSESSMENT

In the future, when a large petrochemical complex or other commodity chemical plant is being planned, the choice of technology and the location of the plant would be reviewed thoroughly from the environmental angle. The Environmental Impact Assessment (EIA) study would be invariably used in the decision making process. While the choice regarding the location of a large plant has always occupied the attention of the management at the highest level, till recently, the decision was made on techno-economic considerations. Since the statutory control authorities now insist on Environmental Impact Assessment, this aspect is also being included for the site chosen. However, EIA study should be an integral part of planning process and technological alternatives and alternative sites for th location of the plant must be examined from environment view-point before arriving at a final decision and seekin the approval of relevant authorities. At present, very fe groups have competence in this interdisciplinary area. Th base line data for the proposed site may not be availab in most of the cases. Enough expertise is not available developing proper models and predicting the future sce ario. Intense research in this area is obviously needed.

OVERALL TECHNOLOGICAL CAPABILITY

The heavy dependence of many sectors of our industr on the foreign countries for the technology for high volum commodity chemicals such as fertilizers, petrochemical petroleum products etc. clearly brings out the gap in ou technological capability. Many large scale multinational an Indian companies have established R and D centres, wit multi-purpose activity. In most cases these centres provid support to production and marketing departments, carry ou trouble-shooting and solve routine quality control problem At a some what higher level, efforts are directed toward minor innovations and improvements and towards adapt ing the foreign technology to Indian conditions. However no attempt is made to assimilate the imported technology Repetitive purchase of know-how is, therefore, a recurrin feature.

The picture is totally different, when it comes to mediun and low volume chemicals. Some of the companies hav shown exceptionally high calibre in developing many phar maceutical chemicals, pesticides, dyes and intermediates fo these products. A peculiar situation prevailing in these sec tors is, however, worth commenting. This refers to the illeg itimate transfer of 'knowhow' from a pioneering compan to many others. The latter hardly spend any effort or money except for the amount paid to the chemist or technologis for secretly procuring the recipe. In fact, many chemists while applying for better jobs, do not hesitate in projectin their technological capability of imparting the so calle 'know-how' for a very large number of items, with whic they have worked. This trend, if it is not arrested, may lowe the motivation of genuine research workers. In the long run the R and D climate of the whole industry may suffer.

The know-how developed in our laboratories is gener ally for a process or product already developed elsewhere The activity, however, calls for a very high level of R an D and should be appreciated in the context of barriers pu by the foreign companies in the transfer of technology. I many cases, the technology may not be available even a a prohibitively high cost.

ome of the areas which are usually ignored or are insuf- ently probed pertain to pollution and environmental ety. In future, the process know-how should be consid- d incomplete, unless these aspects are properly incor- rated in the know-how package. Active research has to o continue in areas of emerging technologies.

HE IMPORTANCE OF IN-HOUSE EFFORTS

As mentioned elsewhere, the Government of India created n ambitious net-work of National and Regional Labora- ories. These laboratories are fortunate in having the best alent in the country. However, the very fact that the research n these laboratories is undertaken under government con- rol, the atmosphere of autonomous scientific community n pursuit of knowledge is lacking. In general, the research nanagement is on lines of bureaucratic controls. Very often, experts show their scepticism about the cost effectiveness of these centres but all attempts to improve the performance mostly end up at the level of administrative measures. Therefore, it is not surprising that these Laboratories have hardly played a significant role in the technological development of this country. There is always a problem of communication between the research laboratory and user industry. In the absence of mutual trust, the transfer of technology is rendered difficult even in the same organisation. The problems associated with the transfer from another research institute are bound to be far more serious. This is particularly so, when either the laboratories have aroused the expectations of the industry too high or the industry expected too much from the research organisation.

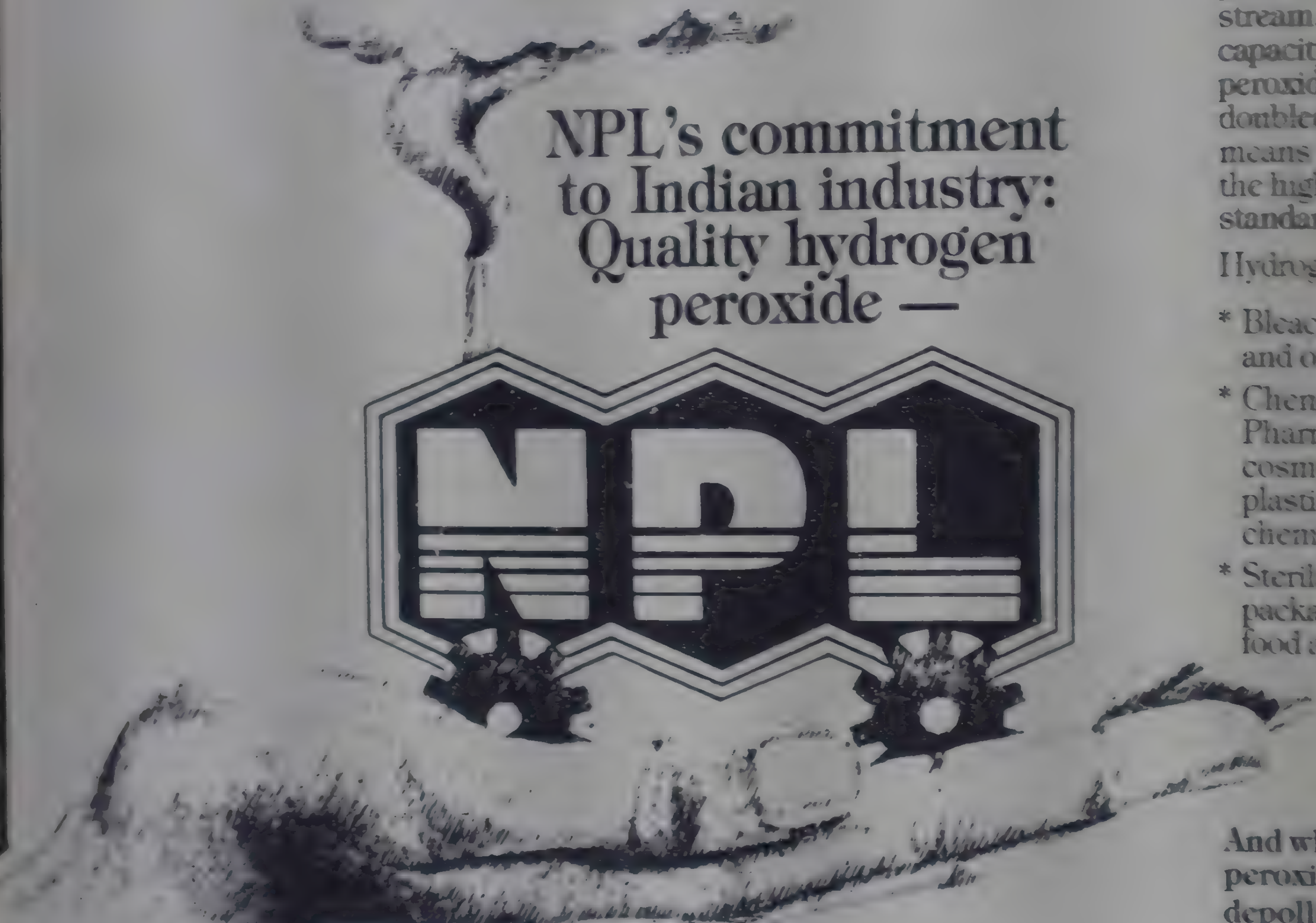
An obvious need in the country is to encourage more and more inhouse research by industry. This would not only enhance the possibility of successful development and acceptance of technology but also create a more mature technical team to tackle the problems associated with the transfer of technology. It must be added that in addition to R and D centre, it is necessary to have strong design groups and forge linkages with project engineering teams. The latter may be within the organisation or from outside agencies.

LACK OF DIRECTION FROM THE TOP

What is perhaps lacking the most is the sincerity of purpose at the decision-making level. Since, public sector companies are occupying the commanding heights of our economy in the chemical sector, let us probe why these units seek foreign know-how, even when local expertise is available or could be developed in a reasonable period. Basically, the decision making rests with bureaucrats. In many cases, an officer from the Indian Administrative Services would opt for foreign know-how because even a generalist like him could go for shopping abroad and acquire th required know-how. The same may apply to even a chemical engineer who may be a management expert but ha no exposure to R and D. It suits him to avoid the vertica transfer of technology from the research laboratory, whic forces him to share the prestige, power and recognition wit a large group of experts.

More or less, an analogous situation prevails in the private sector. A Board of Directors comprising chartered accountants, businessmen, legal experts and industrialists without exposure to science and technology cannot take a bold decision of experimenting with new technologies developed within their own premises. They instinctively prefer proven technology. This can only mean that they would refuse to consider any proposal which is not based on horizontal transfer of technology. It is, therefore, not surprising that major breakthroughs in technology were engineered by companies, who had a Board of Directors with a large number of scientists and engineers or who had at the helm of their affairs a man of vision, who could trust his team of scientists and take calculated risks. Once the attitudinal problems at the highest decision-making level are resolved, the transfer of technology has a high chance of success. When management is reluctant to take risk with new technology, they always argue about guarantees and proven technology etc. But let us examine whether the same management is equally vigilent when some foreign 'know-how' is offered on the pretext of proven technology. The very fact that the process is well established, it may not be the most suitable alternative. Unless the company has done work in a related area, it is extremely difficult to evaluate and select the most suitable technology. As far as guarantees are concerned, these are unduly emphasized. It is well known that many companies, both foreign and Indian, highly over-design the plant, sometimes by a factor of two. In such a case the so called guarantee is automatically taken care of, but at a very high cost to the user industry. Similarly if the claimed yields are not realised, the process licensing company only looses a small portion of the total fees, while the damage to the user industry may be beyond repair.

We should make a beginning by totally banning the repetitive purchase of know-how, which is a recurring feature in India. The technology for high volume commodity chemicals should be thoroughly assimilated by the relevant organisations. The important processes should be simulated, optimised, and future plants should be entirely designed on the basis of local expertise. At present, only detailed engineering is done in India. However, there is no reason why we cannot acquire complete expertise of these technologies, particularly with an intrinsically intelligent man-power available in the country.



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PROGRESS
THROUGH
PRODUCTIVITY

A 3-day international symposium organised by the Insitution of Chemical Engineers at London saw the "Sabotage Theory" for the Bhopal tragedy being propagated for the first time. The author, attending the conference as an invitee-member of the panel, outlines the attempts of Union Carbide representatives to use an international conference on "Preventing Major Chemical & Related Process Accidents" to further their own interests.

"Cheap Trick" of Union Carbide

O.P. KHARBANDA*
Cost & Management Consultant, Bombay.

hen? May 10, 1988.

here? London, Queen Elizabeth II Centre, Churchill litorium.

Vho? Arthur D. Little (ADL), Spokesman: A. S. Kalel-, Sr. VP (ASK).

Vhat? Jury verdict without a trial.

low? Matter being subjudice, Union Carbide spoke ough ADL.

The event? A 3-day international symposium, May 10-12 88 organised by The Institution of Chemical Engineers, in association with The American Institute of Chem- l Engineers (Centre for Chemical Process Safety), The rld Bank and other co-sponsoring bodies world-wide. effect, it was a high-level technical conference attended over 400 delegates from more than 20 countries.

The theme? 'PREVENTING MAJOR CHEMICAL & ELATED PROCESS ACCIDENTS'.

OSPITALITY IS ABUSED

Jearly 60 papers were presented during the course of ree days and to accomodate them all, it was necessary have three parallel sessions every afternoon. Mornings ere devoted to plenary sessions with 3 keynote papers by erts in their respective fields followed by a case history each day. Bhopal dominated the entire conference and its case history was scheduled for the very first day. It was entitled: **Bhopal & Panel Discussion.**

The presentation by ADL spokesman was to take half an hour and 15 minutes were kept for discussion by the panel and questions from the audience. The chairman for this session: T W Carmody, Director, CCPS, AIChE, USA, a former Union Carbide executive. I had been invited to attend this conference in my individual capacity as an invitee-member of the panel. Other members were: J. Gittus, Director, Communications and Information, U.K. Atomic Energy Authority; S. Poltorsycki, ADL, USA.

But in actual fact, there was no panel and no discussion. ASK announced that although he was scheduled to speak for 30 minutes, the chairman had kindly allowed him to take 45 minutes, thus effectively cutting out any discussion by the panel and by the conference participants. This was a pity, for a subject as vital as Bhopal, went by default without presentation of the other side of the issue. Vital? Bhopal has been by far the worst ever industrial disaster, and it is a landmark we could well have done without. Chemical industry would never be the same as before Bhopal, which struck such a severe blow to the image of the industry that the slogan:

Better things for better living **through chemistry** has since been bereft of the last two words.

In fact, this London international event could well have been titled: PREVENTING BHOPALS & RELATED PROCESS ACCIDENTS. In most of the papers and particularly during discussions, Bhopal was mentioned time and again.

The title of ADL's paper: **INVESTIGATION OF LARGE MAGNITUDE INCIDENTS — BHOPAL AS A CASE STUDY** proved to be misleading. The hosts (The

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Latest title: SAFETY IN CHEMICAL INDUSTRY – LESSONS FROM MAJOR DISASTERS (Heinmann, 365p, May 1988) in collaboration with E.A. Stalworthy. Available from VIVEK ENTERPRISES, POB 6526, Bombay, against advance payment of Rs. 628.

Institution of Chemical Engineers, U.K.) probably accepted the paper, in good faith, based on the abstract then submitted. The full paper, when received, probably was not subjected to any review and it was reprinted in full (553-575) in the 642 page preprints distributed to all the participants. But its impact and import does not seem to have been realised until after presentation of the paper and appearance of its reports in the British press the following day based on the luncheon press conference held immediately after the Bhopal session.

It was clear that the British hosts were not only shocked but even embarassed. ADL/UCC chose to use the international technical event platform for their narrow political and legal ends. They had abused the hospitality of the British hosts who, however, graciously explained that the session was under the charge entirely of The American Institute of Chemical Engineers. AIChe should have known better than to lend their name and image to debasing an otherwise top event of the world relating to safety. In retrospect, it seems, that if the hosts knew what they were in for, they would have disallowed presentation of the ADL paper. I hope that the Institution will be bold enough now to omit this paper from the final proceedings.

After the ADL presentation, a Scandinavian delegate sitting next to me asked: 'What do you think of that?'. Being at a loss for the right words, I said "It sounds like a cheap . . . .", and he was quick to add the right word 'trick'? Instantly. I said 'yes, a cheap trick, indeed'!

A VERDICT WITHOUT A TRIAL

The matter being subjudice, UCC chose to stay in the background and let 'their' story be told through a consultant duly paid for the job. UCC officials were, however, present at the conference in good strength, and according to the press reports, they took the lead at the press conference. The paper claims to present the 'facts' and draws the 'desired' conclusion:

> (This) investigation has established that the incident was not caused in the manner popularly reported, but rather was the result of a direct water connection to the tank.

The 'popular report' refers to the accidental influx of a small quantity (perhaps a 'pail') of water into the MIC tank and in sharp contrast, the 'direct water connection' refers to the deliberate introduction of a large quantity (perhaps a ton) of water. In effect the paper clearly and unequivocally proclaims that Bhopal was no accident, it was caused by an act of sabotage. The British press so reported it under headlines, such as:

> Investigator claims Bhopal disaster was sabotage
> *dian)*
> Bhopal report points finger at sabotage (*Times*
> Bhopal disaster 'sabotage' says company report
> *cial Times)*

Significantly, ADL's paper does not even men
serious lapses on the part of the company, as docu
in various investigative reports appearing not only
Indian but also in the respectable (e.g., New York
and the American Chemical Society's Chemical &
ering News) foreign media. Briefly, these are:

* Poor management: Despite several confirme
throughout the life of this plant, management r
complacent.

* Why store MIC at all? MIC is a deadly interm
product and the Indian project team headed by the
ican, Edward Munoz, pleaded for nil or nominal s
They were overruled.

* Poor design: Inadequate safety system.

In retrospect, Bhopal was inevitable, the only q
was: when? The very few and inadequate safety
remained 'silent' witnesses to the disaster. None
were in working condition on the night of Decem
1984, when almost the whole city was turned into a
gas chamber.

ADL and other investigators, including 'scienti
engineers . . . . ., outside experts and attorneys' knew
what they were looking for and lo and behold they
it. It is like an economist or a statistician, faced with
of conflicting data, asking the client:

> What is it that you want me to prove?

A lawyer, even when defending his client-mu
opens his case by stating, 'the facts are . . .', well
that 'facts' are what he wants and 'fabricates', know
Einstein's statement:

> The facts are wrong.

'THE FACTS ARE . . . .'

The formulation and proving of the sabotage theor
several months and obviously its study and poss

must take a few months. But having had an advance the ADL paper, David Bergman of Bhopal Action (BAG), London, was quick to respond at the con- itself, despite the chairman refusing to allow him r. In its usual fairness, The Guardian reported Berg- comments that the ADL report:

> n attempt to divert investigation away from health, ty and technical issues . . .

> a 'completely flawed attempt by Union Carbide to ape moral, legal and financial responsibility for the pal disaster'. BAG's 6-page critique 'Sabotaging the otage theory' of the ADL paper was seen being dis- buted at the conference when the chairman of the opal case history session did not permit any discus- n of the issue. This also had a 4-page annex entitled disaster waiting to happen" from David Weir's 'The hopal Syndrome'.

ne of the major arguments advanced by ASK/ADL in ur of the sabotage theory is that Carbide employees prevented from being interviewed by the company and nvestigating team, until January 1986, over a year after event. Even so, according to the ADL paper, 'critical s were being deliberately omitted and distorted. . . . and e were massive contradictions in their stories'. Perhaps 'critical facts' and the so-called 'contradictions' did not t to the 'sabotage theory' and hence the team relied on esses 'who were not present at the time' — hoping that would oblige? These included a tea-boy, who was ed in Nepal, was flown to New Delhi for the interview h proved to be 'more reliable'! ADL paper claims that:

> eports given by the more peripheral figures . . . became ighly important . . . For these individuals . . . or those ho were not present at the time of the incident, **there as no motive to distort or omit facts** . . . (emphasis s mine).

o you hear an 'echo' of 'What is it that you want me rove'?

HY THIS VENUE & THIS TIME?

One may well reflect on why should Union Carbide have sen this venue and this time for publicising the sabot- theory first propounded in November 1985, also at ndon, at a two-day international symposium, 'THE EMICAL INDUSTRY AFTER BHOPAL'. Here, too, as the only one specially invited from India to present per entitled, 'Lessons from Bhopal'. My presentation was immediately after that of the then Union Carbide's director, J. B. Browning. He stated that some 1000-2000 pounds of water had been deliberately introduced into the MIC tank. Ever since this announcement, Carbide and its friends and consultants have gone on to 'establish' the sabotage theory.

Why London? To get a good international press, which was quite willing to oblige. Why this conference? Being an international technical conference, the paper presented here carries credibility, even though the hosts were embarassed by such an abuse of their hospitality. Why at this time? The High Court of Madhya Pradesh has upheld an order of the District Court that there is 'prima facie' evidence of Union Carbide's liability even though the interim relief has been reduced. The timing has been chosen to try and pressurise the Government of India to make an out-of-court settlement more favourable to Carbide.

What should be a fair compensation? In November 1987, Wall Street Journal (November 2 1987) reported under 'Union Carbide, India appear close to settling Bhopal case', that the gap between the two sides was closing and a settlement may be reached at a figure of $600-700 million. The compensation claimed by the Indian government is about $3 billion and a year earlier, Carbide had offered $350 million. Perhaps, a billion $ would seem to be fair. What is the cost of Bhopal? A difficult, if not an impossible question to answer, but believe it or not attempts have been made to try and value human life. But value of a life to whom? To the person concerned, it doesn't really matter! To the community, it is difficult to assess. To the employer, perhaps an estimate can be obtained, now that companies are beginning to put a value to their human resources. To the family, value will vary considerably from case to case. Human life has been valued differently at figures ranging from $1-$10 million. Using an intermediate figure for each life lost, and an appropriate and proportionate figure for the disabled and the injured, the cost of Bhopal may well exceed $100 billion, some 10 times the total assets of Union Carbide, estimated in early 1985 at about $10 billion. At both the London conferences, I stated:

> It is difficult, if not impossible, to estimate the real cost of the Bhopal tragedy. But if Bhopal had happened in USA, God forbid, the company would have ceased to exist.

And I can add now that this would have happened irrespective of what the true final cause of accident as established by a Court of Law or preferably by a jury of top technocrats of the world. Why the latter? Because lawyers are known to 'create' the 'facts' required to favour their case. And one cannot blame them, after all, it is their profession to do so!

THE AGONY OF BHOPAL

ASK/ADL said that as an Indian, he was greatly agonised by the Bhopal tragedy, but scientific enquiry and investigation must not be allowed to be influenced by personal feelings and sentiments. How right?

This paper by a consultant paid for by Union Carbide is sure to agonise hundreds of millions all over the world. For a few months after Bhopal, some analysts and technocrats gave the company benefit of doubt. Bhopal held many lessons for the chemical industry worldwide and several companies, including Monsanto and Dow well known for safe operations, nevertheless carried out fresh safety audits and provided such additional equipment as was deemed desirable — irrespective of the cost. So did, Union Carbide, for their Bhopal-type plant at Institute, West Virginia. But despite this, a mini-Bhopal did occur at the Institute plant and as a result, Carbide lost much credibility the light of their earlier statement, "It can never hap here!"

I cannot help express my feeling, shared by some ticipants, that the paper may 'backfire' on Carbide. T alone will tell, but the whole affair has left a 'bad ta all around, and Carbide may yet regret the seeming ' tory'.

Meanwhile, it is caught up in a major financial crisi its own creation. The Bhopal tragedy led to a drop in C bide's stock price, and amidst the uncertainty and a p image of Carbide, there was a $4.8 billion hostile takeo bid by GAF Corp. early 1985. As a defensive measure, th was a radical 'surgery' in Carbide's operations, selling consumer products business and taking on a heavy deb order to buy back its own stock. Servicing of this debt proved to be a burden far too heavy for the 'lean' but necessarily efficient Carbide, which has yet to learn to l within its means. It may yet 'weather' this storm as w but it may do its 'concious' good to unload the 'burden Bhopal' instead of trying to 'sabotage' it!

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The growth of the organic chemicals industry has been a mixed one. The author, probes into the reasons for the setbacks, some of which are internal viz. failure to adopt new technologies, cost saving devices -- and some of which are external viz. irrational Government policies, anomolies in the various taxes levied by Government. A systematic product-wise 'status' analysis has been carried out.

eflections on the Existing Status of Fundamental rganic Chemicals' Industry in India and factors for its Future Growth

S. KRISHNASWAMY
President, Chemical Industries Assocition, Madras 600 001.

Chemical Industry in the country has grown and fied considerably over the years. Nevertheless the has failed in many respects:

sorbing new technologies, Cost Saving Devices and niques to improve productivity and quality of end

cause of these aspects, the industry is not able to ome adequately competitive in international market d continuously has to depend on some form of pro-tion even in the internal market.

cause of the various aspects pointed out above and o because of Government pricing and taxation pol-ies (including Excise, Import Duties, Differing Sales ax and other Levies imposed by various State Gov-nments), cost of basic raw material inputs is always a higher level in comparison with international prices. his also proves to be a serious handicap. Example: Fre-uent changes in import policies with respect to DMT, yester Fibre etc.

equent changes in policies — with respect to import, ensing, import duties, international consumption pat-ns etc. and lack of long term perspective plans at the tional and State levels and lack of proper co-dination between policies adopted by Central and State overnments create difficulties for the industry. Exam-e — Alcohol — frequent changes in the Prohibition licies of various State Governments, frequent changes levies imposed by various State Governments, lack a national policy creating situations such as uncer-[illegible] availability, price and wasteful criss-cross transportation. This sort of situation is a great handicap

iv) Governments' submission to political pressure tactics and parochial interests weighs more on the licensing policies and location of various industries, sometimes as in Methanol in specific regions. This creates regional imbalances resulting in huge wastage on avoidable long distance haulage of raw materials and end products in unhealthy price competition leading to many undesirable trends in social life.

v) Mushrooming of low capacity plants stands in the way of higher productivity, introduction of newer technologies ensuring higher productivity, cost reduction steps and quality control. Also proper attention and enforcement on effluent and environment specifications becomes difficult.

GROWTH PATTERN

Growth pattern of certain organic chemicals in the past is analysed in Table-1. Since any study on organic chemicals cannot be totally isolated from petrochemicals, growth pattern of certain petrochemicals which are considered as basic building blocks and availability of which induces growth of other organic chemicals including bulk drugs is also looked into. It is also felt that in the Indian context alcohol based industries need special attention. A separate assessment of this also is given.

PROJECTIONS FOR FUTURE GROWTH

An analysis as above clearly indicates that the growth rate with respect to various chemicals in the past [illegible] over a period of 10 years) is well over 15[illegible] already certain minimum capacities have been built up for most of the essential and bulk organic chemicals, it will be prudent to project future growth rate at 10% per annum during the next 10 years. In other words, projections upto 2000 A.D. should be based on a 10% growth rate.

Incidentally the Swaminathan Committee also recommended that growth rate of alcohol based organic chemicals to be placed at 10%. However, in case of certain items, where the present installed capacity is at a low level and where the country is still depending on substantial imports, creation of additional capacities may have to be at an accelerated rate during the next few years — Example: Methanol. In certain chemicals like Phenol there is no need for additional capacity.

Department of Chemicals and Petrochemicals, Government of India had estimated the demand of certain important organic chemicals as follows:

('000 tonnes)

Chemicals	Production 1986-87	Likely Demand 1989-90
Phenol	32.20	56.00
Methanol	135.62	184.00
Acetone	30.64	52.00
Acetic Anhydride	18.19	24.00
Acetic Acid	53.50	70.00
Formaldehyde	81.00	100.00
Pentaerythritol	5.70	8.15

Likely demands projects for alcohol based chemicals by Bhattacharya Committee are given below:

('000 tonnes)

Chemicals	Production 1986-87	Likely Demand 1989-90
2-Ethyl Hexanol	37.00	67.00
Acetic Acid	55.00	83.00
VAM	23.00	34.00
Acetone	38.00	38.10
n-Butanol	11.00	15.00
Ethylene Oxide	16.50	25.00
Ethylene Glycol (Fibre Grade)	85.00	80.00
DOP	54.00	93.10
[illegible]	62.00	99.00

As against the above, the expected installe for some of the important chemicals are:

('000 M

Chemicals	8
Phenol	
Methanol	
Acetone	
Acetic Acid	
Acetic Anhydride	
Formaldehyde	
Pentaerythritol	

SUGGESTIONS

Perspective Plan

A perspective integrated plan extending to taking into account the demand growth in petro pharmaceuticals and other organic chemicals sho pared and all future policies with respect to licen tional capacity shall be based on such a perspe We are to note that the Apex Committee cons year with Sub-Groups, is on the work and is its task.

Availability of Basic Raw Materials

Steps should be taken to ensure availability of materials in all regions of the country at compar levels and large disparities in freight cost as eg. for Southern India where there is no productive if any, should be corrected by appropriate mea

Additional Crackers

In respect of the above item, atleast two or thr tha/Gas based crackers more will have to be plann doing so the claim of Southern Region -- particula Tamilnadu has to be very seriously considered

Naphtha: Preference to Petrochemicals

Naphtha shall in future be used only for petroc Wherever possible preferential use of gas for fer naphtha shall be looked into and as much napht sible should be made available for petrochemica

Gas Grid

With West, North East and South becoming producing areas the time has come to think of a

, such a step can definitely prove beneficial to f fertilizer and petrochemical and organic chemnes in the country. Similar view has been earlier also.

es/Economic Capacities

f items for which capacities to meet present available, further expansion can only be for the nt of technology and for replacement/addition pment. In essence, the emphasis shall be on helpent smaller capacity plants to achieve economic so that they can have healthier existence. Only d cases where regional imbalance has to be overw plants shall be licensed.

Pollution

expansion of existing capacities is allowed, Govshould insist on locating completely new units in CAL INDUSTRY GROWTH CENTRES'. This shall be made compulsory from the point of view n/environment. New licences also shall be on the ts only.

o.

nol shall be accepted as basic feedstock for chemustry and also as potential replacement (partially) id Fuels including perhaps Diesel. The fact that l can be gas based is of added significance to India. ol can also be looked on as replacement to Alcohol of certain organic chemicals. It seems prudent in growing depletion of oil resources to plan for two plants of capacities 300/500 tonnes per day each fuel oil replacements. Any neglect to plan in this n and time lost in taking steps for the establishment tional methanol capacity thus will prove to be detl to the country's interests.

ir context it may also be mentioned that at least one nt shall be in the Southern Region (e.g. Neyveli) ther one in the Eastern Region (Coal Belt). It is ng to be informed that Steel Authority of India Ltd. s planning to diversify by going in for production 0 tonnes per annum of METHANOL utilising the Naphtha Refining Plant, at Rourkela Steel Plant investment of Rs. 60 crores. Wiser counsels should for diversion of a portion of the product to fuel use ace Diesel.

l

ol is a basic raw material for the chemical industry and in the Indian context a petrochemical substitute. Also the fact that it is a renewable source is of great importance. Installed capacity of distilleries are estimated to be around 1100 million litres whereas production is a little lower than 600 million litres representing just about 55% capacity utilization.

Unfortunately a large portion of the alcohol produced is diverted for potable purposes which results in shortage for Chemical Industry. Following steps with regard to alcohol would be thought prudent.

a) The prospective plan is to be to manufacture 1,400 million litres by 1990- 91. While the country's distillation capacity is for 12,000 lakh litres per annum, Molasses availability is only for 6,000 lakh litres. So, no fresh distillery licences shall be issued except for production based on raw materials other than molasses.

b) Production of alcohol based raw materials other than molasses and diversion of the same even at higher cost for potable alcohol shall be encouraged so that more molasses based cheaper alcohol is made available for chemical industry.

c) Co-ordinated steps by Central and various State Governments shall be taken to see that all Khandsari Molasses is made available for legitimate production of alcohol (illicit distillation and accompanying social evils can be eliminated) and thus maximise alcohol production.

d) Where found possible additional capacities shall be added by allowing smaller distilleries to expand capacities.

e) Methane Gas Generation from Effluent and Fuel Saving/and replacement steps shall be insisted on distilleries and a time bound programme for this is to be worked out.

f) A national alcohol policy should be evolved out and at least a minimum definite portion of the alcohol production should be earmarked for industrial purpose as Tamilnadu is contemplating to spare at least 50% of its alcohol production to Chemical Inustry even if Prohibition is removed.

Molasses

Control on Molasses by State Governments should continue. Export of Molasses outside the country should be completely discouraged. In view of many States still under low Molasses production, exports will starve them further. Moreover it is an economic dictum that for prosperity only value added products like Alcohol or better still Alcohol based chemicals should be exported not the raw material like Molasses. The Chemical Industries Association has come forward to encourage at least 2 Distilleries in a Molasses surplus State like Tamil Nadu to manufacture Alcohol meant for only 100% export if Centre and State fully endorse the view.

Acetic Acid

As seen from the statistics, there seems to be adequate installed capacity for Acetic Acid. Hence, one opines that fresh licenses shall not be issued for a further period of 5 years. However, if any unit which is closed down due to shortage of alcohol wants to change over to Methanol based production, such changes may be considered depending on merits. AABIDA, appears to be against this move

Acetic Anhydride

No new licenses to be issued as there is adequate installed capacity.

Acetone

No fresh licence seems necessary for the next five years.

Formaldehyde

Requirement of Formaldehyde is bound to grow in the years to come particularly as requirement for various types of resins and moulding compounds will increase. However, presently adequate capacity seems to be available and further immediate expansion will not be considered healthy. Imports of misusable products like Paraformaldehyde should not be encouraged as they are wrongly employed for replacement of Formaldehyde in process where PARA is not necessary. It is noted that the current Import Policy has taken note of this.

Phenol

HOC's Cochin Plant coming up, encouragement sh
be given by the exports of surplus.

Maximum Capacity Utilisation

Thus, presently the emphasis should be on:

a) Maximising capacity utilization in every sector of ch
ical industry and with a view to achieve this, susp
further expansion and licensing except in case of u
intended to produce basic building blocks — Naph
or Gas Cracking Units and Chemicals of special pot
tial such as Methanol.

b) Ensure healthier working of existing units & enable th
to absorb new technologies & improve productivity
quality.

Healthy running of existing industries will act as eff
tive catalysts in developing desirable investment tende
and further the growth. This should be looked upon
a long term development strategy.

c) Large number of sick units, resulting in collosal wa
age of national resources (both monetary and human
a disgrace to the stalwarts in industry and the techn
ogists. Effective steps should be taken to see that si
ness is cured and appropriate remedial measures are ta
with a view to remove this scourge from the face of
country and ensure healthy development of industri

d) Industry by itself should protect the labour and soci
from the environmental consequences of the chemi
process involved in each chemical unit. As in Uni
Kingdom, the owners of the industry in each area sho
unitedly join to safeguard the society in the vicinity ren
ering all help in times of any untoward incident or dang

Table - I
GROWTH PATTERN OF CERTAIN ORGANIC CHEMICALS

('000 TONNES)

GANIC CHEMICALS	82-83	84-85 (E)	Average % growth per year	
tone	20	27	17.5	
nol	15	20	16.6	
thanol	42	50	9.5	15.9
etic Acid	34	40	8.5	
etic Anhydride	9	14	27.7	

TROCHEMICALS	75-76	82-83	Average % growth per year (in M.T.)	
enzene	71,224	100,093	5.7	
utadiene	16,323	25,408	7.9	
thylene	64,257	170,274	23.6	
thylene Oxide	9,921	14,677	6.8	20.0
thylene Glycol (Mono)	7,287	17,361	19.7	
hthalic Anhydride	6,429	29,934	52.2	
ropylene	32,766	89,152	24.6	

LCOHOL BASED CHEMICALS	1975	1984	Average % growth per year (in M.T.)	
Acetic Acid	20,531	40,895	11.0	
Acetic Anhydride	5,290	17,124	24.8	
Butyl Acetate	3,830	4,682	2.5	
Ethyl Acetate	3,123	5,076	6.9	
Mono Chloro Acetic Acid	2,998	5,294	8.5	16.9
Butanol	3,522	4,504	3.1	
Butadiene	5,464	6,628	2.4	
PVC	11,384	57,223	44.7	
DDT	4,360	7,300	7.5	
Styrene	9,092	20,018	13.4	
Polyethylene	12,091	79,068	61.5	

E = Estimate. Basis - Centre for Industrial Economic Research Data Book - 1986.

Table - II
CAPACITY AND PRODUCTION OF CHEMICALS DURING 1982-83 TO 1986-87

('000 tonnes)

CHEMICALS	82 - 83			83 - 84			84 - 85			85 - 86			86 - 87		
	Units	Cap.	Prod.	Units	Cap.	Prod.	Units	Cap.	Prod.	Units	Cap.	Prod.	Units	Cap.	Prod.
Acetone	3	21	20	4	24	26	6	35	27	6	35	24	6	35	25
Phenol	2	21	15	2	21	18	2	21	20	2	21.6	18.1	2	21.6	18.5
Methanol	2	44	42	2	44	45	2	44	50	4	81	56	4	22	19
Acetic Acid	14	46	34	17	67	42	19	80	40	19	81	32	19	81	35
Acetic Anhydride	7	16	9	7	16	9	11	28	14	11	28	14	11	28	15
Pentaerythritol	3	4	1	3	4	1	3	4	1	5	5.4	5	5	5.4	5.4

Table - III
DEMAND FOR MAJOR ORGANIC CHEMICALS
(Pre-1985 estimate in m.t.)

CHEMICALS	Base Year 1985-86	1986-87	1987-88	1988-89
Methanol	1,35,625	1,47,151	1,59,654	1,73,220
Phenol	32,000	37,030	42,524	48,971
Acetone	30,645	34,782	39,477	44,806
Formaldehyde	75,600	81,648	88,179	95,233
Maleic Anhydride	3,920	4,390	4,916	5,506
Citric Acid	4,300	4,622	4,969	5,342
Acetic Anhydride	18,190	19,463	20,825	22,283
Sorbitol	8,450	8,989	9,528	10,100
Rubber Chemicals	12,800	13,166	14,088	15,074
Octanol	3,392	3,595	3,811	4,039
Pentaerythritol	5,350	5,725	6,126	6,555
Naphthalene	19,080	20,225	21,439	22,725
Nitrobenzene	27,820	29,767	31,851	34,081
Acetic Acid	53,520	57,248	61,252	65,540
Aniline	11,770	12,504	13,476	14,419

Table - IV
IMPORTS OF ORGANIC CHEMICALS

CHEMICALS	1982-83		1983-84		19
	Tonnes	Value (Rs. in lakhs)	Tonnes	Value (Rs. in lakhs)	Tonnes
Acetic Acid	42.3	5.81	91.3	11.31	95.8
Citric Acid	286.8	29.16	699.2	76.83	116.2
Monochloro Acetic Acid	Nil	Nil	Nil	Nil	1.0
Pentaerythritol	2,258.7	276.36	3,625.6	411.41	1,049.1
Melamine Formaldehyde Resin		0.03	17.7	3.66	5.3
Phenol Formaldehyde Moulding Powder	319.9	28.46	329.1	27.77	602.1
Alcohol Denatured	13.5	1.68	62.5	8.85	96.7
Alcohol undenatured	--	--	13.5	2.38	--

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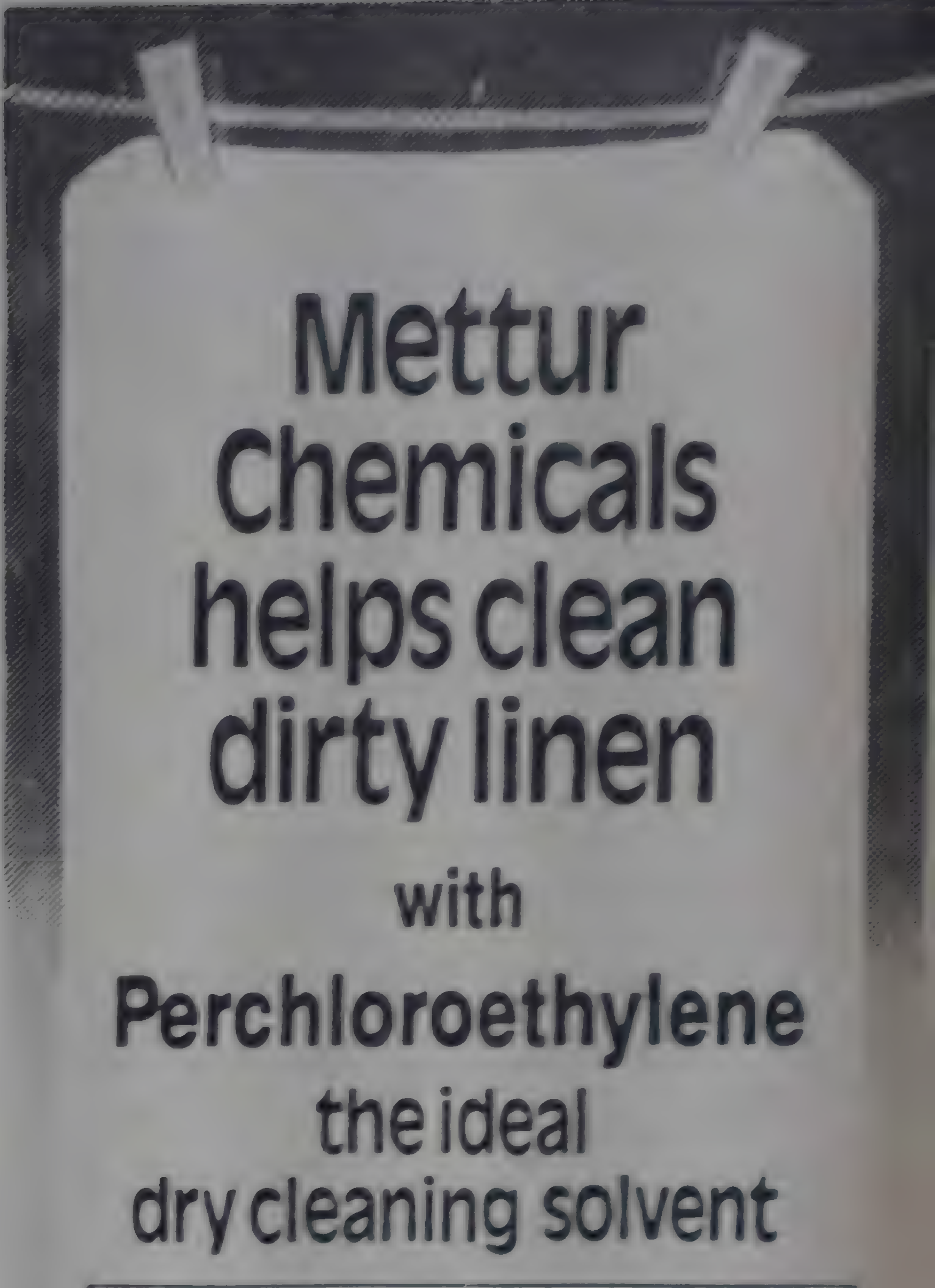

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e role of polymers in taking India into the 21st century can hardly be overemphasised. With the yth of polymers being an energy intensive product having been exploded, the domain of polymers tends to all walks of life in providing clothing, shelter, transportation. However in order to achieve full potential certain imminent steps will have to be taken in the form of restructuring of the ax structures, import duty rates on raw materials and on project imports.

Role of Polymers in a Developing Society

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can play a crucial role in the strategy of devel- virtue of their potential for meeting a variety the common man. In fact, plastics can contrib- e spectrum of social goals, such as poverty amel- nprovement of quality of living, employment gional dispersal of industries, improvement of tivity, preservation of forest cover and mainte- cological balance.

plastics, a class of polymers, have begun to dis- ventional materials in several articles of every- – footwear, household articles, food packaging, e annual per capital consumption of plastics in mere 0.64 kg., against the world average of 13 s have been in short supply and are expensive international standards but considering the vir- mited scope for their use in several fields the consumption is very large. It has been estimated emand for plastics, which has been growing at a d annual rate of 12% can continue to do so for rs to come.

esent policy needs to undergo a radical change if re to achieve the goal of improving the quality of e masses. There is, indeed, need for co-ordinated the part of Government and industry to bring about le climate for the growth and development of the dustry in India in order to meet several national

Misconceptions

variety of reasons, there exists several myths and ptions about polymers.

nerally believed in this country that polymers are for affluent, elitist sections of the population, wher- s are different. Plastic footwear, plastic buckets and mugs and a host of other household items offer eco- nomic and hygienic substitutes for use by the common man. Another misconception is that polymers are energy-intensive and so are out of place in a country which depends on sig- nificant oil imports to meet its energy needs. While pol- ymers appear energy-intensive at first glance, in terms of the relatively small quantities needed for effective end-use in relation to other materials, they are energy-efficient. They displace more energy-intensive raw materials like wood, glass, paper and metals.

Fears are sometimes expressed that plastics may displace conventional raw materials such as jute in packaging and thereby jeopardise the livelihood of jute growers and the growth of the jute industry. The fact is that by the year 2000 A.D. the country's requirement will have reached 4,500 mil- lion sacks, while jute would be able to provide only 420 (or 1,900 million sacks) and the gap will have to be met by HDPE/PP woven sacks. Thus, plastics will merely be supplementing jute rather than displacing it as a raw mater- ial.

It is commonly held that polymers would involve a heavy foreign exchange outgo. The existing and new oil refiner- ies in the country and the natural gas produced in the oil fields are likely to be able to meet a major portion of the feedstock needs of the petro-chemical industry. To the extent that they are not, it would be more cost-efficient to import the basic feedstock, naphtha and add value to it rather than importing the endproducts.

It is a myth that polymers are expensive in this country because manufacturers are making excessive profits. How- ever, when the cost components of polymers are studied closely, it would become apparent that the high cost of feed- stock (much above international levels), obsolete technol- ogy, uneconomic size of plants, and high levels of duties are mainly responsible for high polymer prices.

Yet another misconception is that India cannot export plastics and other polymers and their end-products. Despite the high cost of plastics, exports amounting to Rs.72 crores were achieved in 1986 and if prices of raw materials and intermediates were lower, and other handicaps reduced, the target for 1990 could be substantially higher than the amount of Rs. 125 crores now envisaged.

Ethylene cracker complexes have almost become status symbols judging from the keenness of various States to locate one within their boundaries. But this enthusiasm is misplaced since naphtha crackers are not employment-intensive. The employment potential of petrochemical industries exists mainly in the downstream processing units. These need not be located in urban areas in the proximity of oil refineries, unlike naphtha-based Cracker complexes which need to be close to the refineries for drawing their naphtha supplies. Thus States should be more keen to deploy their limited resources on the development of downstream processing units.

Lastly, the view that polymers are a luxury and India cannot afford them is unfounded. Once the polymer industry in India becomes internationally competitive, the picture would change dramatically and the industry would make a major contribution to the achievement of many national goals.

What Polymers Can Do

Polymers can do wonders for the less affluent by bringing within their reach items of everyday use such as footwear, buckets and clothing which they cannot afford as related conventional raw materials such as leather, brass and cotton are no longer cheap.

Clothing

All the world over, cotton garments are becoming expensive and only the rich can afford them. The common man's clothing is more often made from synthetic fibres and blends, which besides being lower-priced, are durable and offer wash-and-wear qualities.

In India, the artificially high cost of producing synthetic fibres and fabrics is encouraging smuggling, which in turn is affecting the indigenous industry. There is enormous scope for reducing the cost of synthetic garments by lowering duties and feedstock costs and making them as economical as they are elsewhere in the world. The idea of polyvastra was based on this concept.

Footwear

The country produces about 360 million pairs of fo wear (leather, rubber and plastic), and assuming multi purchases by a number of users, a majority of the pop lation go bare-footed. There is no hope of providing at le one pair of leather footwear to every Indian by the year 20 A.D. Leather footwear would not only be beyond the pu chasing power of many but also virtually impossible to pr vide despite India's large cattle population.

Plastics provide an economic substitute for leather; leath chappals cost over twice as much as plastic footwear. prices of plastics fall as a result of production econom and lower duties, it would become possible to supply fo wear to a high proportion of the population at afforda prices.

Shelter

Plastics are extensively used abroad in the building indu try. They are mainly used in window frames/panels, pipe storage tanks and insulation. An estimated 2,50,000 MT expandable polystyrene is used in the building and constru tion industry in Western Europe annually. India uses on around 50,000 tonnes of plastics in the building industr against 4 million tonnes in the US. If plastics became chea they would find greater use in providing pre-fabricate low-cost shelter for the less affluent. Even now used PV and polyethylene film finds use as crude protection for hu ments and shanties in the rainy season.

Transportation

Polymers are increasingly used in the transportatio industry. Synthetic rubber (SR) supplements natural rubb in tyres for two-wheelers, automobiles and animal-draw vehicles. The annual demand for SR in the transportatio sector is 35,000 tonnes and this may grow to 1,80,000 tonn by 2000 AD.

Packaging

Packaging is a major outlet for plastics. By providin cheap packaging material they have a role to play in redu ing the effective cost of basic items of consumption su as foodgrains, edible oils, milk, sugar, etc. to the consume Packaging in conventional materials such as jute, glas wood and paper is not only expensive but will also be ina equate even to meet the country's exploding demand f bulk packaging alone, as indicaed in Table 1.

TABLE-1

stimated Production of Main Packaged Bulk Commodities

	1986	2000 AD
l grains (mn. tonnes)	152	250
ent (mn. tonnes)	036	100
ar (mn. tonnes)	008	025
ilizers (mn. tonnes)	007	025

s a result of the growth in production of basic items consumption, the packaging needs of the country for these ns alone would be enormous by 2000 AD. The overall ed of bulk as well as retail packaging will grow dra- tically, particularly as the consumer revolution gathers omentum. Quite apart from fancy packaging for expen- ve products, the plastic bag is becoming an article of mmon usage for all sorts of articles of daily consump- on by the less affluent. There is no way in which this mand can be met by conventional material. There is a isconception that plastic packaging would displace the nventional packaging materials such as jute, paper and ood. This belief is unfounded as the acerage under for- sts and jute is not keeping pace with the increasing needs f the packaging industry and productivity increases are nlikely to be adequate to meet the rising demand.

This is brought out clearly in Table 2.

TABLE-2

	1984/85	2000 AD
Total sacking require- (Mn. Nos.)	1,960	4,500
Total jute sacking Available (Mn. Nos.)	1,600	1,900
Demand Gap (Mn. Nos.)	360	2,600
Equivalent quantity of HDPE/ PP required to meet supplementary demand (tonnes)	39,000	2,86,000

Agriculture/Forestry/Ecology

Plastics can also play a major role in improving farm productivity, through new techniques of plasticulture. Plastics are extensively used in water management. Apart from helping to provide clean and hygienic water supply in rural areas, they are efficient substitutes for metal or concrete pipes in irrigation of farm areas. The use of LDPE sheets for canal and reservoir lining helps reduce seepage losses. Besides, plastic pipes and fittings find a place in drip irrigation. An important use of plastics is in mulchingR, which seeks to provide a protective covering to the roots of plants and trees so that moisture is retained longer.

Heavy duty LDPE film is used for outdoor storage of foodgrains while HDPE/PP crates for fruit and vegetable packaging provide a good substitute for wood. Plastics are also increasingly finding application in the manufacture of gas holders and other components of gobar gas plants.

The country has launched a massive afforestation programme and as many as 5 million hectares of land are to be brought under forest cover per year. Plastics make excellent nursery bags for holding the saplings in the initial stage prior to planting. Thus, plastics have a role to play in the country's afforestation programme. The annual demand for plastic for nursery bags alone is estimated at 65,000 tonnes if the target of afforesting 5 million hectares of wasteland per year is to be achieved.

Reusable HDPE/PP crates for packing fruit and vegetables are a good substitute for wooden crates. One of the reasons for rapid deforestation is the subsidised price of wood used for making wooden crates. According to one estimate, trees on 10 hectares of land have to be cut every year to pack apples produced on 1 hectare of orchard. At this rate our forest cover would soon be destroyed and the ecological balance disturbed . Plastics used in the place of wood in the packing, furniture and building industry help in conservation of forests, prevention of soil erosion and maintenance of the ecological balance.

Energy Conservation

In relative terms, plastics are conservers rather than high consumers of energy. Although they have an inherently high level of feedstock-energy component, they have a low weight/effectiveness ratio in several end-uses. The use of plastics in several applications can thus save much energy in comparison with available alternatives. Plastics are less energy-intensive, when compared with conventional items such as paper, glass, wood, cement, and metals. Table 3 illustrates the level of potential energy savings by substitution of plastics for conventional materials.

Polyurethane foam and expanded polystyrene used in the insulation industry help conserve heat/cold. The use of plastic components in automobiles assists in improving fuel efficiency by reducing the weight of the vehicle.

TABLE-3

Item	Energy Saving %
1. Pipes: PVC vs GL	88
2. Overhead storage tank: LDPE vs galvanised steel	93
3. Milk packaging: LDPE pouch vs glass bottles	39
4. Edible oil packaging: HDPE vs tin containers	90

Exports

Plastics have not been able to contribute satisfactorily to the country's export efforts in view of their high cost in India. However, as petrochemical units undertake modernisation programmes and scale up their capacities to minimum economic size with modern technology, the scope for exports would improve. For instance, NOCIL has proposed a major expansion of its ethylene capacity to 3,00,000 tpa with a massive export commitment of Rs. 500 crores over 7 years.

The scope for value-addition in polymers is enormous and their exports should be encouraged as a strategy to improve our foreign exchange earnings. For instance, Rs. 1 worth of ethylene can be converted into Rs. 2.5 worth of High Density Polyethylene which in turn can yield end-products (e.g., a bucket) worth Rs. 5/- in the present Indian environment. (It is recognised, however, that the corresponding figures overseas will be different).

Currently, India exports just about Rs. 72 crores worth of plastic goods and this may increase to Rs. 125 crores by 1990 if the present targets are achieved. However, if duties are reduced and input prices are brought down to international levels, with improved competitiveness stemming from economies of scale and modernisation of technology, Indian plastic exports could go up considerably.

Employment Potential/Small Scale Units/ Regional Dispersal

Although the employment potential of a basic petrochemical unit is limited, the downstream processing industries are labour-intensive and can create significant job opportunities. The polymers processing industries alone have an employment potential estimated at 1 technically-oriented job for every 10 tpa of polymers. The total employment potential, including non-technical personnel, could be four to five times that number. Thus by 2000 A.D. polymers could provide employment to over 3.5 lakhs technic skilled persons and a total (technical and non-technical some 1.4 million persons.

Since the downstream plastics industries are genera reserved for the small-scale sector, the growth in petroche ical complexes will give a big stimulus to this segment industry. There were over 10,000 small-scale plastics p cessing units in the country in 1986 and by 2000 A.D., number is expected to increase to at least 30,000 unit

The petrochemicals industry can also help in regional d persal of industry as the downstream units do not have ma locational constraints. Being non-hazardous in nature a having a high value-addition poetential, they can be set in any location determined largely by demand conside tions. The States would also gain in terms of revenue ge erated by way of sales tax. In many ways, the processi sector offers greater opportunities for employment gene tion through industrialisation for States than the large ba petrochemical complexes.

Consumption/Demand Forecasts

The average per capita consumption of plastics in Ind is 0.64 kg, as against the world average of 13 kg per annu The Indian polymers market is in the early stages of t 'S' curve for demand growth and the opportunities for bo supplementing traditional materials and introducing inn vations are considerable.

The trends in the growth of consumption and dema for various polymers since 1965 are shown in Table 4

While the above rates of growth for 2000 AD are pr jected at current prices, the scope for further improveme in demand is large with reduction in prices of polymers seen from Table 5.

It will be observed from Table 5 that European pric are about half the Indian prices. This is indicative of th ground that has to be covered in lowering prices of plasti to international levels.

Revenue

It should be noted that a rational fiscal policy would sti ulate demand and, in the process, increase revenue gen ration for the Government. It will be seen from Table below that even a 25% reduction in excise duty rate expected to stimulate demand and increase the substitutio potential of plastics vis-a-vis other materials like glas

TABLE-4

('000 TONNES)

	1965	1986	CARG** (1965-86)	2000*	CARG** (1986-2000)
Commodity Plastics	35.0	523	14%	2516	12%
Synthetic Rubber	20.0	66	08%	364+	08%
Synthetic Fibre	4.5	183++	23%	1000	12%

Projections are based on end-use analysis for 1989-90 and, for further projections, growth rates equivalent to Level I have been taken from the report of the Apex Committee.

Compound annual rate of Growth.

This compares with 212,000 tonnes of total synthetic rubber projected in level 3 in the Report of the Committee for Perspective Planning of Petrochemical Industry: 1986-2000 A.D. (popularly known as the Apex Committee) which is though to be an underestimate.

1985.

TABLE-5
Prices in India & Europe
(Indian prices indexed to 100)

	India 1.9.1987 (incl. of Taxes)	Europe 1.9.1987 High	Europe 1.4.1986 Low
1. LDPE	100	43	39
2. HDPE	100	44	36
3. PVC	100	55	45
4. PP	100	50	37
5. PS	100	55	39

TABLE-6
Revenue Generation From Commodity Plastics at Resin Stage
(Excise, Sales Tax, Octroi & Customs)

(Rs. Crores)

	1986	Level II 2000 AD	Level III 2000 AD
Revenue			
Excise (including CVD)	240	1361	1362
Customs	170	395	554
Sales Tax (@ 4%)	24	169	218
Octroi (@ 2%)	21	117	150
Total	**455**	**2042**	**2284**

Assumptions:

1. Current level of prices before taxes.
2. In 1986, the import level is around 40% of consumption by weight and estimated at 20% by 2000 AD.
3. Level II -- projections are based on end-use analysis for 1989-90. For further projections, growth rates equivalent to Level I have been taken. The current excise duty rates have been assumed for calculating revenue generation.
4. Level III -- projections (where demand is stimulated by reduced taxes) are based on substitution potential and assumes additional 3% growth rate p.a. in VIIIth and IXth Plan periods above Level II figures. The excise duty rates have been reduced by 25% for calculating revenue generation.
5. Demand levels in 3 and 4 above have been obtained from the Report of the Apex Committee.

paper, tinplate, wood, etc., and spur greater revenue generation rather than adversely affecting it.

The data in Table 6 show that at constant levels of duties, the revenue generation would rise more than four times from Rs. 455 crores in 1986 to Rs. 2,042 crores in 2000 A.D. However, the benefit of reducing excise duties by 25% would be enormous as demand would be stimulated with reduction in prices. If excise duties were reduced by 50%, demand should be stimulated still further and revenue generation increase.

The high cost of naphtha, the basic feedstock is also a major constraining factor to demand stimulation. The Indian price of $272/tonne is 66% higher than the current European cif price of $164. It is ironical that the petrochemical industry, which accounts for only 20% of the total consumption of naphtha in India as against the fertiliser industry's consumption of 80%, has to pay 60% more for its feedstock. Again, the fear that a reduction in the naphtha price for petrochemicals would lead to a loss of revenue to Government is unfounded as with the realisation of the considerable demand potential brought about by a reduction in polymer prices, the net effect would be higher total revenue generation as seen earlier from Table 6.

TAKE OFF INTO THE WONDERFUL WORLD OF POLYMERS

What Government can do

1. The first major step that needs to be taken on an urgent basis is to reduce the naphtha price to the international level.

2. The second step should be to reduce the heavy tax burden in terms of excise duty, sales tax, octroi and customs duties to bring down the end-price of articles of everyday consumption -- footwear, buckets, synthetic fibres etc. As illustrated earlier, the measure would in the long run bring about increase in revenue generation.

3. There is also a strong case for reducing the prevailing high level of customs duty on project imports where equipment and machinery are not locally available.

4. It would be necessary to encourage petrochemical units, both at the basic and downstream stages, to grow to Minimum Economic Size (M.E.S). In the case of some plastics MES has already been stipulated by Government and the concept needs to be extended to other polymers.

5. The Industrial Location policy with respect to existing units needs to be made more realistic. Subject to condition that the environment protection laws should strictly observed, expansion and modernisation of ex ing units should be permitted at the present sites in or to conserve scarce capital and to protect exist employment. The case for doing this is particularly str where by the adoption of modern technology, the un are able to contain pollution in absolute terms to lev permitted for their existing operations. The country c ill afford to have petrochemical complexes relocat involving duplication of infrastructure and escalation capital costs.

6. It is equally important to reduce bureaucratic and pr cedural delays, which are mainly responsible for tar implementation of projects and cost escalation, th defeating the objective behind the recent process of li eralisation of regulatory policies.

7. A liberalised policy regarding imports of technolog and modern equipment for processing plastics into en products would give a much-needed boost to the smal scale conversion units to modernise their facilities an build up local and export markets.

8. Another major step would be to establish at least on industrial estate for processing of plastics in each Stat Adequate testing and quality control equipment shoul be set up in each industrial estate, in order to provid quality control facilities to the small-scale units in the vicinity.

9. The grave danger to our ecological balance posed b the cutting of trees for making wooden crates should b averted by encouraging mass manufacture of plasti crates. The misconception that plastic crates are mor expensive than wooden crates will be dispelled once th heavy subsidy element on wooden crates is withdrawn This would be the logical step for popularising plastic crates and conserving our forest wealth.

10. Finally, a climate of free competition should be generated unhindered by over-restrictive licensing and controls, specifically by moderately over-licensing capacity.

What Industry Needs to do

There are three stages that need to be considered when reviewing the role of industry in petrochemicals in order to reach international levels of efficiency. They are the basic stage, processing stage and equipment manufacture. Firstly, the manufacturers of base chemicals and resins ought to nise their plant and processes and scale up their capac- o internationally economic size. This is necessary to ove yields, reduce energy/utilities consumption and the f production at the primary stage of production through ative search for efficiency, monitoring of performance good management.

he primary stage of manufacture is much more energy- nsive than the processing stage. There is, therefore, con- rable scope for introducing energy conservation mea- s in the primary stage. Being a continuous process istry, it would be necessary for the cracker complexes educe dependence on State Electricity Boards for their wer supplies. They should take up co-generation of steam d power and optimise energy usage.

As the plastics industry grows and develops, new mar- ts need to be created. Efforts will have to be concentrated developing new uses and applications.

At the second stage of manufacture, where petrochem- als are processed into end-products, steps will have to be ken to remain competitive. Manufacturers at this stage will kewise have to modernise their equipment and their man- acturing processes and develop high-value-added products hich will entail market development. Strict quality con- ol measures will have to be implemented, particularly if e export market is to be developed.

The equipment manufacturers too have a role to play in ringing plastics within the poor man's reach. They must dopt new technology and reduce their costs and selling rices.

Ultimately, it will be the responsibility of the base chemical/resin manufacturer and the processor of plastics to pass on to the consumer the benefit of cost-savings arising out of reduced price of raw materials/excise duties and cheaper processes of manufacture.

Lastly, the manpower and training needs of the plastics industry will have to be taken care of if the industry is to launch its second phase of growth and development. The current and potential dearth of skilled operators in the plastics industry will have to be made up by expanding and dispersing the available training facilities. This is particularly important for operators and craftsmen. The Indian Plastics Institute and Industrial Training Institutes must draw up a suitable training programme for this purpose. New training institutions to impart specialised skills to suit modern technologies will also need to be set up.

CONCLUSION

Polymers hold great promise for improvement of the quality of life of the common man and for meeting his basic needs. They will bring within his reach a wide spectrum of products, right from the humble mug, bucket, plastic bag and footwear to a dazzling array of items on the shelves of supermarkets.

They can help to achieve other national goals such as the creation of employment, growth of the small-scale sector, the regional dispersal of industry and energy conservation. With determined and coordinated effort by industry and Government, polymers can play a major role in taking India into the 21st century.

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Plastics have been universally recognised as energy conserving materials. A developing country like India cannot afford to waste natural resources or consume energy higher than what is warranted. It is, thus, essential for the Government, the end-users and others to be aware of the important role played by plastics. With the current foreign exchange constraints and scare material resources, it is very essential that purposeful steps be taken to promote the use of plastics. The author, who is at helm of affairs of the plastics industry, discusses the various measures to be aaopted by the Government in promoting this vital segment of the Indian industry.

The Indian Plastics Industry

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By the end of the century, the population of our country likely to be nearly a billion. Satisfying the basic needs of a population of this magnitude as well as improving the andard of living would exert tremendous pressure on various resources. The restricted availability of natural products and their depleting stock would naturally make us earch for alternatives to meet the growing demand. In this ontext petrochemical products would not only prove desirable but also essential as options in our pursuit to achieve better quality of life.

Petrochemical products would be specially needed to meet the incremental needs of materials and also where uperior characteristics/properties are required in many a demanding application. In the present day competitive world, the country has to strive for better and more efficient usage of its natural resources and opt for products which are functionally superior and economically competitive. In this, the petrochemical industry with its wide range of a new breed of synthetic raw materials can satisfy our quest for more efficient end products for numerous applications.

As the economy moved into the 70's and then the 80's, certain major changes occurred. For instance domestic production of hydrocarbons increased substantially and the use of both consumer and intermediate synthetic products progressively gained favour on account of both economic and functional efficiency, while in many cases their supplemental role proved to be of critical value. Also synthetic products had come to touch the lives of large segments of the society to their benefit. The approach to the petrochemicals industry therefore underwent a radical change and this came into evidence when in the Seventh Plan it was included as one of the thrust areas.

The range of petrochemicals and their usages are wide and diverse. There are large varieties of plastics, both thermoplastics and thermosets. Besides these, there are a large variety of engineering plastics and speciality polymers that have critical application in areas requiring stringent performance criteria. The range of usage of plastics is also wide enough to encompass almost all facets of our daily life as well as important sectors such as agriculture, transportation, communication, defence, aviation, space research and electronics.

The industry has a well established base both for production as well as marketing with nationwide distribution and servicing networks. The per capita consumption of petrochemicals in India is however still very low, a mere fraction of that of the industrial countries.

In our country, however, the current level of per capita consumption is just 0.6 kg. plastics compared to the world average of 13 kg. and 89 kg in USA, 58 kg. in Japan and 63 kg in Western Europe. In a growing economy like ours with a large and growing population, foreign exchange constraints and scarce material resources, it will be necessary to take purposeful steps to promote the use of plastics. In other words this industry has a long way to go to contribute its potential in full measure to the economy of the country. Given proper promotional support the industry could, however, now grow at a rapid pace.

The Apex Committee for perspective planning of petrochemical industry (1986-2000) has projected the demand of plastics from the 1985-86 level of half a million tonnes to 1.8 million tonnes by 1994-95 and 2.6 million tonnes by 2000. To meet this demand indigenously, six crackers and five aromatic complexes are required to be set up and the total investment envisaged is Rs. 23,000 crores. Further, down-stream processing of plastics into consumable goods would involve an additional investment of Rs. 12,000 crores. Taking an average investment of Rs. 10 lakhs per unit, this would mean setting up of 120,000 plastics processing units.

The cost of petrochemical products has been high in our country due to imposition of heavy and multiscale fiscal levies. This has restrained the growth of demand for these products. In view of the fact that these products are essential and not luxury items as they supplement our natural resources, and also contribute to the basic needs of people, the Apex Committee expressed the view that the end product should be available to the consumer at a reasonable price. To achieve this end, the Committee recommended that the price of feedstock namely, naphtha/gas may be fixed at the same levels as fixed for production of fertilizers. It also recommended that the excise duty on polymers which vary from 30 to 40% may be brought down to the minimum level of 15% of the basic value. It further recommended that while continuing with policy of OGL, the import duties may be so rationalised as to bring the landed cost of various products closer to the indigenous prices reached after implementing the above mentioned.

Considering the humble beginnings of the industry about three decades ago, the industry has recorded an impressive growth rate and today, it occupies an important position in the national economy. Between 1979-80 and 1984-85 the industry achieved a commendable compounded annual growth rate of 12%. The future holds great promises for this industry in India, not only in terms of quantum growth of the industry, but also a qualitative change in terms of technology up-gradation, end-use applications and marketing skills. There will be a substantial increase in indigenous manufacturing base for commodity plastics, and first generation engineering plastics, thereby reducing the industry's dependence on imports and also promoting growth in exports.

It is estimated by the Perspective Plan Committee that by 2000 AD, the per capita consumption will increase by more than three times to 2.16 kgs. and the industry is expected to record a CARG of 12% during the 8th Plan and 17% during the 9th Plan.

The plastics industry today plays a significant role in most of the key sectors of Indian economy which include inter alia agriculture and water management, automobiles and transportation, building and construction, telecommunications and electronics (telematics). Besides substantial increase in contribution to the sectors, areas of defence and aerospace, computers and power transmission are also expected to be significant end-use sectors for plastics by the turn of this century.

The consumption of plastics in agriculture and water management in 1984/85 was 1.0 lakh MT. and this w up to 1.8 lakh MT by 1989-90, recording a growth of In the field of eletronics the consumption will record a tum jump from only 25,000 tonnes in '84-'85 to 1,4 tonnes by 1989-90. The building and construction ind would be one of the largest end-users of plastics wi estimated consumption of 2 lakh MT by 1989-90. would be significant increase in the consumption of tics in Indian automobiles with a total consumptic 22,000 MT by 1989-90. The plastics content per ve will increase to produce light weight, fuel efficient veh

The Government has rightly recognised the import of the petrochemicals and plastics industry which have identified as a thrust area for the current 5-year plan. Government has also drawn up ambitious perspective p stretching upto 2000 AD covering the entire gamut o petrochemicals industry. The Government has now s the Petrochemical Development Council and the Petroc ical Promotion Development Authority to deal specifi with the problems and plans for the industry covering topics as:

a) Feed-stock availability and pricing.
b) Technology upgradation both in raw material manu ture and processing sector.
c) Training and availability of skilled manpower.
d) Promotion of end-use applications in key economi tech areas like building and construction, transporta eletronics, agriculture, water management, aer osp defence, etc.
e) Licensing of expansion proposals of new units determining the economies of scale for productio
f) Conservation of energy and natural resources, pollu control, recycling of waste materials, etc.
g) Import and allocation of raw materials.
h) Export promotion.
i) Review of fiscal imports like excise duty, import etc.
j) Quality assurance and consumer protection.

However, the industry would require more active in from the Government, particularly through special poli and fiscal measures to sustain the quantitative growth qualitative changes envisaged in the perspective plan. It be appropriate if the plastics industry is not viewed in lation, but as an important and integral sector of the In economy.

The processing sector occupies a unique and key p tion within the plastics industry. It forms a vital link betw the raw material manufacturer and the end-user, be it in household. This sector has played a pioneering role verting enormous quantities of raw material into e end-use applications. As of 1985-86, there were 10,000 units predominantly in the small scale sector. of the machines used were of indigenous origin. Of ue to market compulsions, we have witnessed qual- e changes within this sector.

ere has been a growing demand for sophisticated and h applications as also larger and more intricate indu- mouldings. This demand is likely to grow further in e. Similarly, requirements in the field of packaging have rgone tremendous changes with the introduction of ern packaging media like co-extruded and high barrier s, form-fill-seal packs and asceptic packs.

ndia, with an overwhelming population living in villages, rs probably the biggest rural market in the world. We definitely expect that in the ensuing decades this vast al market will open up to absorb substantial quantities commodity plastics, both in agriculture and consumer lications. Plastic pipes have already made deep inroads agricultural applications.

For centuries, Indian villages have been served by skilled isans, like the iron monger, cobbler, potter and so on. the end of this century, we can add another to this list . the artisan for plastics. In fact, such skills as hand ulding, welding and fabrication of various plastic arti- s, will become a lucrative trade for a sizeable section the rural population to service the plastic consumption this sector. The Government should seriously consider nging tiny/cottage plastic processing units under the nbrella of Khadi and Village Industries Commission VIC) and extending the attendant benefits to it.

The relevance of the plastics industry to the Indian econ- my will be evident from the contribution it makes to the ational exchequer by way of excise and customs duties d other taxes. In fact, in 1986-87 out of a total gross reve- ue of Rs. 25,770 crores from excise and customs duties, e plastic industry made a contribution of Rs. 823 crores, presenting 3.2% contribution. This was substantially igher than the contributions made by traditional high lume groups like paper and paper products (1.5%), jute .1%), aluminium (0.8%) and glass and glassware (0.7%). ontributions were also favourable when compared to the iant sector—iron and steel, whose contribution was 6.2%.

In addition to excise and customs duties, substantial contributions are also made by way of octroi, sales tax, income tax and turnover tax. It is estimated that the current contribution by way of sales tax is around Rs.130 crores while that from income tax is Rs. 40-50 crores. Thus in 1986-87, the total contribution to the national exchequer could exceed Rs. 1,000 crores.

The industry has also earned valuable foreign exchange for the country and both the volume and the value of exports have risen steadily over the last 10 years. In fact, export of plastics and processed products earned foreign exchange equivalent to Rs. 48 crores in 1985-86 and will reach Rs. 125 crores by 1989-90. The exports recorded in 1985-86 are much more than other items like iron and steel, inorganic chemicals, agrochemicals, etc.

One of the most significant contributions already being made by the plastics industry to the national economy and exchequer is towards conservation of energy and scarce natural resources. A developing country like India cannot afford to waste natural resources or consume energy higher than what is really warranted. Plastics have been universally recognised as energy conserving materials right from the point of manufacture of raw materials upto the conversion state. Thus, it is essential that the Government, the consumer or the end-user and the plastics industry should be aware of this important role of plastics and propagate its usage to replace conventional materials wherever feasible.

The major negative point in the growth of the plastics processing industry is the price and availability of plastics raw materials. This limits consumption of plastics even in areas where it is beneficial. In order to encourage use of plastics in agriculture as well as in the industrial sectors it is necessary to review the levies and taxes on raw materials and finished goods so as to generate more demand and thus further increase production. Currently the industry is facing an acute crisis because of shortage of raw materials and their rising prices in the international market. The processors have been put to great difficulty since imports have been prohibitive. The key issue involved is that the landed price of imported material is exhorbitantly high compared to the indigenous material due to the present unrealistic high import duty structure. The only longterm solution to the problem is to rationalise the import duty on imported polymers in such a way that there is no significant price difference between the local and imported materials.

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From humble beginnings the caustic soda industry has grown substantially. However problems plague the industry -- high cost of electricity have bought about technology changes. The author has systematically analysed the growth and prospects to a state when it truly can be called a "Chloro-Alkali" industry.

Caustic Soda Industry: Present and Future

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Caustic soda is a basic inorganic chemical. It was first anufactured in our country in 1941 in two plants, each iving 5 tonnes per day capacity. From this modest beginng the Industry has come a long way in its 47 years of istence with an installed capacity of 11.46 lakh tonnes annum in 1988. There are 39 manufacturing units all ver India. While 28 units use mercury process, 8 units are ill having diaphram process. One uses chemical process nd the remaining two have adopted the latest membrane chnology. The manufacturing process is basically elecolysis of brine solution (common salt) in all the three techologies viz. mercury, diaphram and membrane. Along with austic soda, chlorine and hydrogen are also produced.

Caustic soda is used in a large number of industries such s Paper, Rayon, Soap, Aluminium, Cotton Textiles, Dyesuffs, Fertilisers, Petrochemicals, Power Houses, Drugs and harmaceuticals and in Demineralisation Plants. Chlorine, co-product of caustic soda, has wide applications in many ndustries including Paper, PVC, Benzene Hexa Chloride, DT, Stable Bleaching Powder, Dyestuffs etc. and in water reatment.

The industry in India has, at present, a total installed capacity of 11.46 lakh tonnes per annum. An additional capacity of 3.85 lakh TPA is already sanctioned (2.51 lakh TPA for new units and 1.34 lakh TPA by way of expansion). Five units have abandoned operation recently due to various reasons. The capacity of these units amounts to 2,000 tonnes per annum. Thus, the installed capacity in operation at present is 10.64 lakh TPA.

CAPACITY UTILIZATION

Table I shows the installed capacity, production and capacity utilisation since 1949. Industry has never achieved hundred percent capacity utilisation. In 1986, it was 65%, which can be considered uneconomical. Today it is

TABLE-I

Installed Capacity, Production and Capacity Utilisation of Caustic Soda

(lakh tonnes)

Year	Installed Capacity	Production	Capacity Utilisation(%)
1949	0.19	0.11	57.9
1955	0.45	0.35	77.8
1960	1.21	0.98	81.0
1961	1.24	1.20	96.8
1962	1.32	1.27	96.2
1963	1.81	1.52	84.0
1964	2.30	1.84	80.0
1965	2.85	2.15	74.4
1966	2.85	2.30	80.7
1967	3.57	2.57	72.0
1968	3.83	3.02	78.9
1969	3.83	3.43	89.6
1970	3.90	3.62	92.8
1971	4.17	3.77	90.4
1972	4.77	3.94	82.6
1973	5.41	4.11	76.0
1974	6.01	4.28	71.2
1975	6.21	4.38	70.5
1976	7.10	4.97	70.0
1977	7.29	5.13	70.4
1978	7.82	5.50	70.3
1979	8.03	5.71	71.1
1980	8.26	5.54	67.1
1981	8.59	6.14	71.5
1982	8.88	5.95	67.0
1983	9.33	6.00	64.3
1984	10.62	7.00	66.0
1985	10.92	7.09	64.9
1986	10.99	7.11	64.7
1987*	11.46	7.72	67.4

* Figures of 1987 are estimated.

more than 70%. The utilisation declined between 1982 and 1986 for a number of reasons. The availability of power, the main input, has always been erratic. Frequent power cuts have been imposed everywhere, particularly in the southern states. There was also some stagnation in demand. The disposal of chlorine has always been a constraint, caustic soda and chlorine being co-products. In India, the industry is known as Caustic Soda industry, where as it is Chloro Alkali in western countries. The imbalance between the demand of caustic soda and that of chlorine has often forced the manufacturers to cut down production of Caustic soda.

Table II shows the demand and availability of caustic soda in India during the past years. The shortfall has been marginal. The industry is in a position to meet the domestic requirements provided there is some stability in power supply and chlorine utilization is maintained. As will be seen, chlorine demand is really increasing in the country. Nearly 85% of the caustic soda production is in lye form and it is impossible to accumulate large stocks. Moreover, holding large chlorine stock may not be advisable. Today there is capacity of flakes out of the total lye capacity. This will give further, flexibility to the industry in maintaining production. However, with coming in of Reliance which has been accounted for in computing capacity, caustic soda may be surplus.

TABLE-II

Demand & Availability of Caustic Soda in India

(Lac tonnes)

Year	Installed capacity	Production	Demand	Shortfall(-) /surplus(+)
1974	6.01	4.28	4.60	-0.32
1975	6.21	4.38	4.40	-0.02
1976	7.10	4.97	4.95	+0.02
1977	7.29	5.13	5.10	+0.03
1978	7.82	5.50	5.75	-0.25
1979	8.03	5.71	6.10	-0.39
1980	8.26	5.54	5.95	-0.41
1981	8.59	6.14	6.11	+0.03
1982	8.88	5.95	5.91	+0.04
1983	9.11	6.00	6.03	-0.03
1984	10.62	7.00	6.94	+0.06
1985	10.92	7.09	7.30	-0.21
1986	10.99	7.11	7.50	-0.39
1987*	11.46	7.72	8.00	-0.28

* (Figures of 1987 are estimated)

The present policy of import of caustic soda has been [illegible] for the indigenous producers. The tight [illegible] market for caustic soda as reflected by the higher international prices of caustic soda (aro tonne as reported by European Chemical New 6, 1988) has given further impetus to the don which may continue atleast for another year

Under the new Import Policy 1988-91, Cau been now shifted from List of Canalised Iter Restricted Items. Further, the demand of Nal a further boost to the caustic soda market. Nal chase from the domestic market so far has been tonnes.

Caustic soda is a power intensive industry. age, 3,700 units of electricity is required to tonne of this material(5). The cost of power al to 74% of the variable cost of production as Pie chart. The average cost of electricity for has risen from 27.4 paise per unit in 1980 to unit in 1987. In 1973, it was just 9 paise per in the states of Maharashtra and Gujarat now more than Rs.1.20 per unit. The impact of one p per unit is about Rs.38/- in the cost of produ tonne of caustic soda. The impact of such up in the cost of electricity needs no elaboration shows the variable cost structure of caustic s

The various units all over the country have stantly trying to reduce the consumption of e make the operation economically viable. As a s this, manufacturers have changed over from graphite anodes to metal anodes, which results of 10-12% of electricity per tonne of caustic nearly 80% of the total installed capacity oper metal anode technology. Many of the units are a sidering switch over to the latest membrane c ogy which will result in substantial saving in consumption.

CHLORINE

The economic viability of a caustic soda pl depends on the effective utilisation of chlorine seen from the Table IV that utilisation of chlori stantially improved over the years. However, th price in the country has relegated chlorine to th a by-product. The international price of chlor higher when compared to the domestic price. I $350 per tonne(7). On the contrary, chlorine pr is reportedly the lowest in the world, the maxi limit being a mere Rs.1,500/- only per MT. for the low price in India is that in the early industry, chlorine did not find any use and wa

TABLE-III
Variable Cost Structure of Caustic Soda[6]

r	Salt Rs./MT	Power Rs./KWh.	Graphite/Anode Recoating & Inv. Cost Rs./MT	Mercury Rs./Kg.	V. cost Rs./MT
6	127	0.150	108	69	1178
77	138	0.157	101	61	1216
78	171	0.192	111	62	1418
79	194	0.250	162	100	1740
80	208	0.274	165	141	1873
81	217	0.360	182	169	2235
82	230	0.484	250	194	2846
83	236	0.528	250	200	3022
84	249	0.613	250	193	3359
85	276	0.704	250	225	3758
986	273	0.813	250	213	4151
987	276	0.900	250	225	4483

Annual Report, Alkali Manufacturers Association, 1986.

MS: National Average consumption is taken as base to calculate the Variable cost. After 1981, most of the units had started changing Graphite to Metal Anodes. Hence, anode investment and recoating cost has been consisered from 1982 onwards.

TABLE-IV
Chlorine Utilisation in India

Chlorine produced	Gainfully utilised	% Utilisation
311	245	79
361	305	85
369	316	86
416	344	83
434	382	88
470	423	90
489	429	88
482	433	90
535	476	89
519	468	90
532	475	89
630	565	90
635	580	91
636	595	94
672	645	96

e: Annual report of the Alkali Manufacturers Association of India, 987 figures are estimated.

a nominal price. The Indian caustic soda industry has gradually making efforts to utilize chlorine fully. rine finds wide applications today in the manufacture per, newsprint, pulp, PVC, DDT, Bleaching Powder t, water treatment

The lower price of chlorine is expected to continue for at least a few more years till it finds wider applications and the industry is able to sustain the demand for chlorine. Only this will make the caustic soda industry economically viable.

FUTURE TREND

An attempt is made here to forecast the demand for caustic soda and chlorine upto the year 2000. The method is multiple regression. The demand/output of almost all the end users of caustic soda in India has been collected. These data are collected from the market survey report on caustic soda, chlorine and Hydrochloric acid conducted by Tata Consultancy Services for Alkali Manufacturer's Association of India. The data upto 1983 are the actual figures. Future growth of these industries upto 2000 is taken as estimated in the report and projection has been done accordingly. An attempt is also made to correct the data wherever possible. Missing data are estimated. The demand of caustic soda upto 1985 is collected from a report titled Industry Profile — Caustic soda published by the Financial Express in its issue dated 6th Feb. 1987. Demand in 1986 and 87 are collected from various reports of AMAI.

A multiple regression model is built with enduser indus- tries demand as independent variables and the demand of caustic soda as the dependent variable by using computer The demand is expressed as function of the growth of th end user industries. If X1, X2, X3 . Xn are the d the user industries, the demand of caustic soda. Y can be expressed as follows:

$$Y = B_0 + B_1X_1 + B_2X_2 + \ldots\ldots + B_kX_k + e$$

where B_0, B_1 ...... are partial slopes in the multiple regression equation (in other words, B_j, j not equal to zero represents the expected change in Y for a unit change in X_j while holding all other Xs constant) and e is a random error term, which is usually denoted by the greek letter epsilon. The same methodology is adopted for forecasting the demand for chlorine also. The demand of end user industries of Chlorine is taken from the same market survey report and the demand of chlorine is taken from Alkali Manufacturer's Association's annual report. The demand/consumption of chlorine includes chlorine used as Hydrochloric acid also. Table V, VI, VII and VIII shows the actual and future demand of Caustic soda, demand/output of user industries of caustic soda, actual and forecast for demand of chlorine and demand/output of user industries of chlo tively.

The multi collinearity among the variables ca out in the above model. Even then, the model sidered good as the error is negligible as will b the table. Moreover, the forecast for 1990 is 9.2 as against the 9.50 lakh tonnes envisaged in 19 7th Five Year Plan.

From the forecast of demand arrived at an showing the year-wise growth rate of caustic soc ine upto 2000, it is evident that demand of c grow at a faster rate than caustic soda. The dem tic soda by 2000 is estimated at 14.68 lakh ton of chlorine is estimated at 14.57 lakh tonnes. Wh tioned additional capacity of 3.85 lakh tonnes be rational, there will be no need for furthe

TABLE-V

Caustic Soda Demand in India

Year	Demand Lac MT	Forecast Lac MT	Error Lac MT	% Error	Growth MT
1974	4.60	4.59	0.009	0.19	
1975	4.40	4.45	-0.053	-1.20	-20000
1976	4.95	4.93	0.017	0.35	55000
1977	5.10	5.08	0.09	0.58	15000
1978	5.75	5.78	-0.028	-0.49	65000
1979	6.10	6.10	0.001	0.02	35000
1980	5.95	5.95	0.002	0.04	-15000
1981	6.11	6.10	0.007	0.12	16000
1982	5.91	5.92	-0.008	-0.14	-20000
1983	6.03	6.02	0.013	0.21	12000
1984	6.94	6.94	0.000	-0.01	91000
1985	7.30	7.22	0.078	1.06	36000
1986	7.50	7.53	-0.025	-0.33	20000
1987	8.00	8.04	-0.036	-0.45	50000
1988		8.53			52821
1989		8.89			36277
1990		9.26			36644
1991		9.64			38730
1992		10.10			45663
1993		10.57			46972
1994		11.06			48985
1995		11.58			51633
1996		12.12			54722
1997		12.70			58026
1998		13.32			61959
1999		13.98			65721
2000		14.58			69382

[illegible]

TABLE-VI

Yearwise Demand/Output of Caustic Soda units & user Industries

(Unit: Lakh tonnes except in case of Cotton, which is in mill. mtrs.)

Caustic Soda	Paper X1	NP X2	PULP X3	VSF X4	MSF X5	VFY X6	ALM X7	COT X8	SOAP X9	DYE X10	DET X11
4.60	8.60	2.00	1.18	0.78	0.0032	0.386	1.6	7000	7.80	0.18	0.41
4.40	8.70	2.00	1.08	0.67	0.0032	0.35	1.65	7000	8.08	0.19	0.75
4.95	8.80	2.00	1.27	0.83	0.0032	0.433	1.7	7000	8.35	0.2	0.79
5.10	9.38	2.18	1.27	0.86	0.0032	0.427	1.75	7300	8.62	0.202	1.04
5.75	10.06	2.81	0.93	0.88	0.0032	0.447	2.11	7628	8.89	0.204	1.22
6.10	10.47	3.6	1.29	0.85	0.0677	0.44	1.89	7533	9.17	0.205	1.54
5.95	11.12	3.57	1.31	0.69	0.0532	0.415	1.87	8368	9.44	0.20	1.79
6.11	12.35	3.5	1.39	0.86	0.0857	0.402	2.02	7983	9.75	0.19	1.70
5.91	12.8	3.52	0.798	0.49	0.03462	0.359	2.19	7953	9.93	0.195	1.64
6.03	11.8	3.46	0.70	0.64	0.0578	0.348	2.80	9342	10.00	0.17	1.41
6.94	13.53	3.72	1.25	0.80	0.12	0.4	2.85	9762	10.61	0.325	1.74
7.30	14.21	3.98	1.44	0.82	0.15	0.405	3.26	10201	10.9	0.338	1.90
7.50	14.92	4.25	1.65	0.88	0.18	0.4105	3.43	10660	11.19	0.352	2.07
8.00	15.66	4.54	1.69	0.89	0.23	0.4158	3.78	11140	11.50	0.366	2.25
	16.45	4.86	1.71	0.90	0.27	0.421	4.08	11641	11.82	0.380	2.45
	17.27	5.19	1.81	0.93	0.29	0.427	4.53	12165	12.14	0.395	2.67
	18.13	5.55	1.92	0.95	0.31	0.432	4.97	12712	12.48	0.411	2.91
	19.04	5.93	2.03	0.99	0.33	0.437	5.48	13284	12.84	0.428	3.17
	19.99	6.34	2.15	1.02	0.36	0.444	6.06	13882	13.17	0.445	3.45
	20.99	6.78	2.28	1.05	0.39	0.450	6.31	14507	13.56	0.463	3.76
	22.04	7.25	2.41	1.08	0.42	0.456	6.57	15160	13.94	0.481	4.09
	23.14	7.75	2.55	1.11	0.45	0.462	7.10	15842	14.33	0.500	4.46
	24.30	8.28	2.70	1.14	0.49	0.468	7.67	16555	14.73	0.520	4.85
	25.51	8.86	2.86	1.17	0.53	0.474	8.28	17300	15.14	0.541	5.29
	26.79	9.47	3.03	1.21	0.57	0.480	8.94	18078	15.57	0.563	5.76
	28.13	10.12	3.21	1.25	0.62	0.486	9.66	18892	16.00	0.585	6.27
	29.53	10.82	3.40	1.28	0.67	0.493	10.40	19742	16.45	0.609	6.83

of Detergents, actual production in the organised sector only is considered as the consumption of caustic soda by the unorganised sector gible. The Actual production data upto 1985 is taken from the article titled 'Soaps & Detergents: Problems & Prospects', published by a' Express in its issue dated Jan. 12, 1988.

f the User industries, data upto 1983 are actual. Future growth upto 2000 is taken as estimated in the market survey report prepared Consultancy Services and projection has been done accordingly. In case of Caustic soda, the figures shown above are actuals.

r; X2-News Print; X3-Pulp; X4-Viscose Staple Fibre; X5-Modal Staple Fibre; X6-Viscose Filament Yarn; X7-Aluminium; X8-Cotton ; X9-Soap; X10-Dyestuff; X11-Detergents.

reover, every unit can produce 25% more than the d capacity. Again conversion from mercury electro- lls to membrane cells will create more in-built capac- nce, the existing capacity of 1.46 lakh tonnes and ditional capacity sanctioned (3.85 lakh TPA) will be ent to take care of the demand fully upto 2000.

It is possible that under the prevailing circumstances, the industry cannot achieve capacity utilisation beyond [illegible] But, even at this moderate level, the industry will be able to meet the demand fully, including that of NA_2CO_3. In spi of sufficient capacity, the problem stems from poor [illegible] of utilisation which is expected to continue.

TABLE-VII
Chlorine Demand in India

Year	Demand Lac MT	Forecast Lac MT	Error Lac MT	% Error	Growth MT
1974	3.05	3.25	-0.203	-6.67	11000
1975	3.16	3.27	-0.114	-3.61	28000
1976	3.44	3.35	0.088	2.54	38000
1977	3.82	3.71	0.109	2.85	41000
1978	4.23	4.14	0.089	2.11	6000
1979	4.29	4.38	-0.093	-2.17	4000
1980	4.33	4.27	0.062	1.43	43000
1981	4.76	4.61	0.149	3.13	-8000
1982	4.68	4.82	-0.140	-2.99	7000
1983	4.75	4.73	0.017	0.35	90000
1984	5.65	5.47	0.184	3.26	15000
1985	5.80	5.78	0.022	0.37	15000
1986	5.95	6.12	-0.174	-2.92	50000
1987	6.45	6.46	-0.007	-0.11	35560
1988		6.81			42428
1989		7.23			57589
1990		7.81			67050
1991		8.48			40528
1992		8.88			43901
1993		9.32			59700
1994		9.92			64145
1995		10.56			68942
1996		11.25			74120
1997		11.99			79712
1998		12.79			85753
1999		13.64			92280
2000		14.57			

[illegible] upto 1987 are actuals.

Under these circumstances, it is imperative that the Government does not allow any additional capacity to be created and declares a moratorium on licensing for the setting up of further capacity during the next 5 years, as recommended by the industry. No further rise in power cost would also help a great deal. It is necessary to study intersectoral impact of power cost on caustic soda industry.

The trend for the future as shown above indicates better growth rate for the consumption of chlorine than caustic soda. When the unit by Reliance is established, the regional imbalance of caustic soda production will also be felt in western region which has a natural advantage over other regions. Our policy for the industry in future should be such that chlorine or caustic based units should be encouraged at places where caustic soda units are existing. This will avoid the need for establishing new units. By the year 2000, [illegible] the caustic soda industry is likely to achieve the [illegible] of Chlor-Alkali industry. Caustic soda and chlorine based units should be encouraged near the existing units [illegible] to reduce power [illegible] should be adopted forthwith particularly when it [illegible] ses environmental pollution. Capacity utilisation s[illegible] encouraged by facilitating better availability of [illegible] cheaper cost to this basic industry which is vital to [illegible] strial development of the country.

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7. European Chemical News, Dated June 6, 19[illegible]

TABLE-VIII

Yearwise Demand/Output of Chlorine Units & User Industries

(Unit: Lakh tonnes except in case of Cotton, which is in mill. mtrs.)

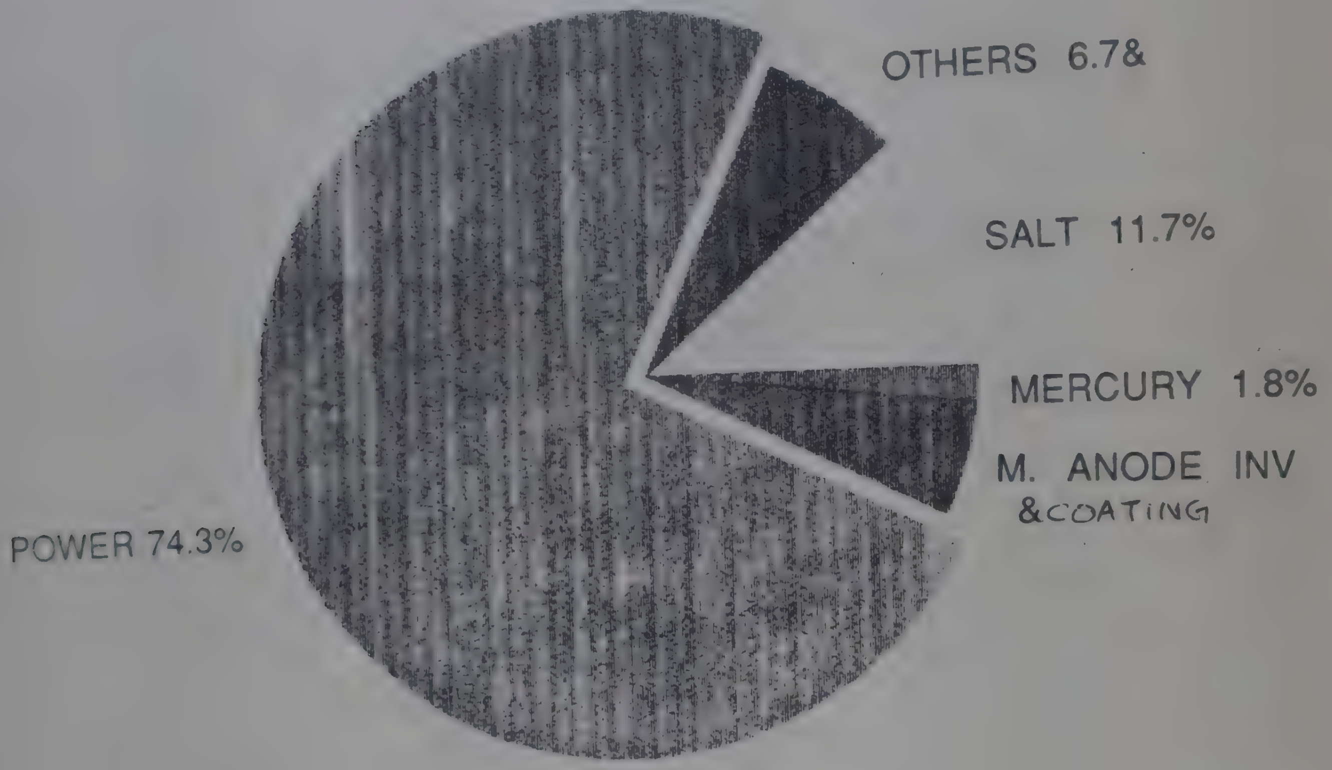
ar	Chlorine	Paper X1	NP X2	PULP X3	COT X4	DYE X5	PVC X6	BHC X7	DDT X8	SBP X9
74	3.05	8.60	2.00	1.18	7000	0.18	0.47	0.227	0.03	0.229
75	3.16	8.70	2.00	1.08	7000	0.19	0.44	0.243	0.03	0.253
76	3.44	8.80	2.00	1.27	7000	0.20	0.47	0.239	0.03	0.247
77	3.82	9.38	2.18	1.27	7300	0.202	0.59	0.272	0.03	0.267
978	4.23	10.06	2.81	0.93	7628	0.204	0.63	0.334	0.047	0.309
979	4.29	10.47	3.60	1.29	7533	0.205	0.52	0.342	0.047	0.320
980	4.33	11.12	3.57	1.31	8368	0.200	0.42	0.284	0.04	0.33
981	4.76	12.35	3.50	1.39	7983	0.19	0.41	0.284	0.032	0.34
982	4.68	12.8	3.52	0.798	7953	0.195	0.46	0.341	0.05	0.36
983	4.75	11.8	3.46	0.70	9342	0.17	0.53	0.318	0.08	0.43
1984	5.65	13.53	3.72	1.25	9762	0.325	0.75	0.32	0.09	0.46
1985	5.80	14.21	3.98	1.44	10201	0.338	0.80	0.32	0.09	0.49
1986	5.95	14.92	4.25	1.65	10660	0.352	0.85	0.32	0.09	0.53
1987	6.45	15.66	4.54	1.69	11140	0.366	0.92	0.32	0.09	0.57
1988		16.45	4.86	1.71	11641	0.380	1.00	0.32	0.09	0.61
1989		17.27	5.19	1.81	12165	0.395	1.12	0.32	0.09	0.65
1990		18.13	5.55	1.92	12712	0.411	1.35	0.32	0.09	0.70
1991		19.04	5.93	2.03	13284	0.428	1.65	0.32	0.09	0.75
1992		19.99	6.34	2.15	13882	0.445	1.70	0.32	0.09	0.80
1993		20.99	6.78	2.28	14507	0.463	1.75	0.32	0.09	0.86
1994		22.04	7.25	2.41	15160	0.481	1.93	0.32	0.09	0.92
1995		23.14	7.75	2.55	15842	0.500	2.12	0.32	0.09	0.99
1996		24.30	8.28	2.70	16555	0.520	2.33	0.32	0.09	1.06
1997		25.51	8.86	2.86	17300	0.541	2.56	0.32	0.09	1.14
1998		26.79	9.47	3.03	18078	0.563	2.82	0.32	0.09	1.22
1999		28.13	10.12	3.21	18892	0.585	3.10	0.32	0.09	1.31
2000		29.53	10.82	3.40	19742	0.609	3.41	0.32	0.09	1.40

E:

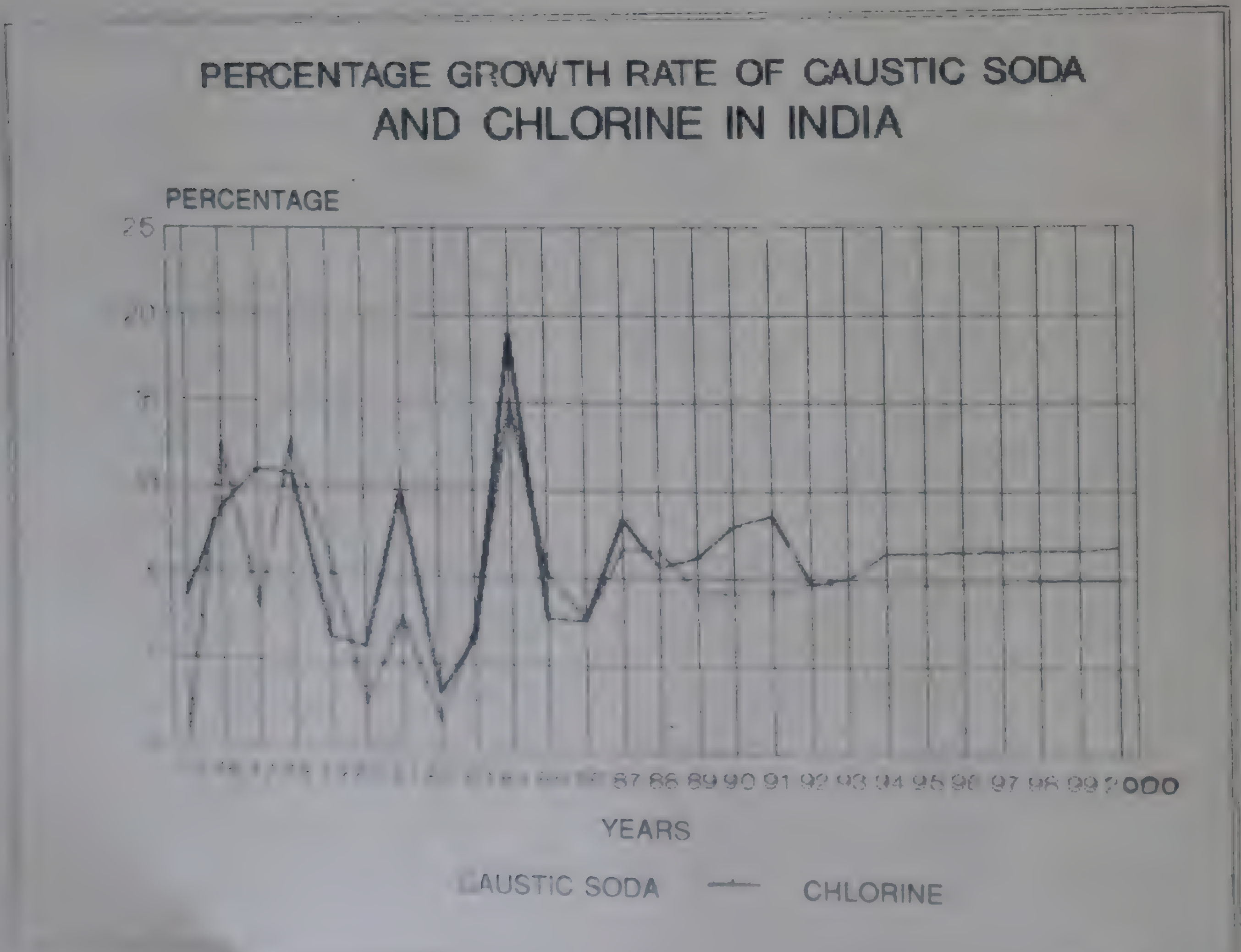
data pertaining to the end user industries is collected from the market survey report on Caustic Soda, Chlorine and Hydrochloric Acid ucted by the Tata Consultancy Services for Alkali Manufacturers' Association of India. Data upto 1983 are actual. Future growth upto is taken as estimated in the report and projection has been done accordingly. The chlorine demand as shown above include chlorine utilised lrochloric Acid also and are actual figures.

per; X2-Newsprint; X3-Pulp; X4-Cotton Textiles; X5-Dyestuff; X6-PVC; X7-Benzene Hexachloride; X8-DDT; X9-Stable Bleaching Powder.

CAUSTIC SODA - VARIABLE COST STRUCTURE



National average consumption.



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Gram: SCENTOUS, Telephone: 64551
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SISTER CONCERN

AROMA CHEMICAL

To take up the challenge "Health for all by 2000 AD", the pharmaceutical industry is facing hurdles and problems at every stage. The author, who is the President of IDMA, has analysed the pitfalls of the Government's policy and the problems of the small scale pharmaceutical producers. The author calls for a joint effort by all the manufacturers to motivate the Government and the trade towards a better national growth.

Pharmaceutical Industry Passing through a Testing Time

VINOOBHAI U. SHAH
President, Indian Drug Manufacturers Association, Bombay 400 018.

Pharmaceutical Industry in India today is facing a
an task of making quality drugs and medicines avail-
reasonable price to the ailing masses of the country.
s, it is a grave concern of every sector of industry
re the gigantic responsibility of the ambitious plan
Government — "Health for all by 2000 AD". It is
onsoling to note that the Pharmaceutical Industry in
has gone a long way in making remarkable progress
n bulk drugs production & formulations adhering to
ict quality standards. The progress would have been
ore significant if there were conducive and growth
ed policies from the part of the Government. Today
onfronted with the most challenging situations.

NEW DPCO AND ITS SLOW EMENTATION

ook almost 7 years of spade work for the Govern-
finally to announce the much awaited new drug policy.
k another couple of years for the partial implemen-
of the same. Pharmaceutical Industry is facing hur-
d problems at every stage. Government machinery
rticularly BICP needs to be activated in speeding up
cedures and formalities at all levels. For, at times
s months and years before the crucial decisions are
We notice that there is a lack of co-ordination among
fferent ministries involved in the health care even
they are situated at the same place in Delhi.

LINING PROFITABILITY OF THE RMACEUTICAL INDUSTRY

ere has been a wrong notion spread that the Phar-
al Industry is profiteering. Highly controlled as it
Industry's profitability is constantly eroded over the
due to several factors. And today it has come down even to 4 to 5% leaving no motivation and incentives to the manufacturers to produce certain vital drugs and medicines.

There is a three-tier control on industry — control on bulk drugs prices; control on formulation prices and ceiling on overall profitability. As a result of this tight control, the Industry has received serious set-backs in its health as reflected from the following figures of continuously declining profits:

TABLE

	Profit before tax as % of sales
1969-70	15.47
1974-75	10.70
1977-78	11.70
1980-81	8.80
1982-83	7.50
1983-84	6.70
1984-85	5.80
1985-86	4.50

Source: 1969-70 -- Hath Committee Report, 1974-75 to 1980-81 -- RBI Bulletin (Covers drugs and non-drugs) 1982-83 to 1983-84 -- NCAER Study; 1984-85 — A.F. Ferguson Survey; 1985-86 -- OPPI Estimate.

At this juncture it is the prime responsibility of the Government to see that every sector of the Pharmaceutical Industry is maintained.

TRADE PROBLEMS

It has been observed and has been a common experience of the manufacturers that the drug trade associations have been taking them for ransom on the issue of trade margin and other allied problems related to distribution. Both the small scale manufacturers and the larger companies as well are harassed by these trade associations. We are never against the trade in getting their legitimate trade margin. But what is deplorable is their unfair trade practices of extorting funds from the manufacturers under the pretext LOC (letter of co-operation) NOC (no objection certificate) for introducing a product. Industry will have to be firm against these unethical practices. Further what is a crucial issue at this point is their claims of commission on excise duty which directly goes to the Government and manufacturers are benefited by it. We would suggest that the Government reduce the taxes and increase the trade commission if need be. The need of the hour is to join hands unitedly as one unit of Pharmaceutical Industry and fight out this menace seeking timely co-operation from the Government. As manufacturers we have a right to live in dignity and carry on our business without giving into any pressure tactics from any section of the trade.

HIGH TAXATION ON MEDICINES

Taxes on medicines are taxes on sickness. The taxes levied on drugs and medicines in our country are very high; to the tune of 63 paise on every rupee worth medicine one buys. These taxes include:

100-125% Custom Duty on imported raw material
13% Excise Duty
12% Surcharge
4% Sales Tax (State)
4% C.S.T.
1-2% Octroi, etc.

Added to this there are direct and indirect taxes on bottles, caps, aluminium foils, packaging material, etc. We fail to understand the rationale behind Government policy that when the duty concession could be granted to such items like Nylon, Electric goods, Paper industry, etc. why the Government is reluctant to exempt/reduce the medicines from taxes and give relief to the ailing consumer public. While in foreign countries Government takes the responsibility of providing free health to the people, would it not be desirable in our country for the Government atleast to exempt the medicines from taxes and help the ailing people.

IRRATIONAL DUTY STRUCTURE

The duty structure in our country on drug intermediates and raw materials need to be rationalised. At times there are lot of anomalies such as the duty on drug intermediates is higher than the final product. We do not think that any where in the World such a high percentage of duty on drug intermediates and raw material. This extraor high percentage of duty reflects in the costing of lations and calls in massive investment from the smal ufacturers over a single product and is a discourag to the bulk drug manufacturers. Any Governmen whether it is duty or any other taxes will ultimat passed on to the consumer and pose as a financial b to the common ailing people. We would therefore ur Government authorities to keep the duty on drug inte iates to the minimum and proper rationalisation of th structure.

CONVERSION NORMS

The conversion norms adopted in the costing of the and medicines are the same old Conversion Norms an to be revised urgently. As the expenses on all count key inputs such as labour, electricity, fuel, water etc.) risen multifold, manufacturers will not be able to mak ends meet on the costing done on the basis of old version Norms.

SMALL SCALE SECTOR STRUGGLING FOR SURVIVAL

Small scale sector of Pharmaceutical Industry is o the most haunted and troubled sector of the industry t Their very existance is being threatened due to the fo ing factors:

i. Phasing out the loan licensing system by 1990

There are over 8,000 loan licensing units in the cou whose survival is at stake inspite of the fact that they rendered remarkable services to the national sector o Pharmaceutical Industry. Besides making the medic available these units also are responsible for holding price line without compromising the quality of the d and medicines.

ii. In House Testing Laboratories: Democles swor hanging on the small scale units

Small scale units have been harassed by the FDA aut ities on the issue of in house testing laboratory. Failur establish these testing laboratories would logically lea the cancellation of the licenses of the small scale unit is true that the GMP and the quality measures are absolu necessary. It would not be justified to force the small s units who cannot afford the establishing and maintair of the in house testing laboratories due to various kn

The best alternative would be while encouraging : testing laboratories, small scale units should be to get their products tested by the approved Gov- t laboratories or cooperative laboratories.

an licensing units being deprived of the excise t

e loan licensing units are manufacturers by their own ney should be granted status of small scale units and necessary benefits accruing thereon. Thus as small units they should be given the benefit of excise duty ption in par with the other small scale units.

emption of Small Scale Units from Price Control

all scale units should be exempted from price control both in formulations as well as bulk drugs. Though the exemption is granted in category II items, we would appreciate if the Government could consider this exemption also in category I items as well.

This is because as specified above, the small scale units have rendered significant contribution to the growth and development of the Pharmaceutical Industry in India. This exemption will go a long way in creating an atmosphere of growth for these small units. At this juncture when the industry is passing through a testing time the need of the hour would be for the manufacturers to work unitedly joining hands with all the sectors of the Pharmaceutical Industry and motivate the Government and the Trade and thus contribute towards the national growth inspite of the hurdles and bottlenecks on the way.

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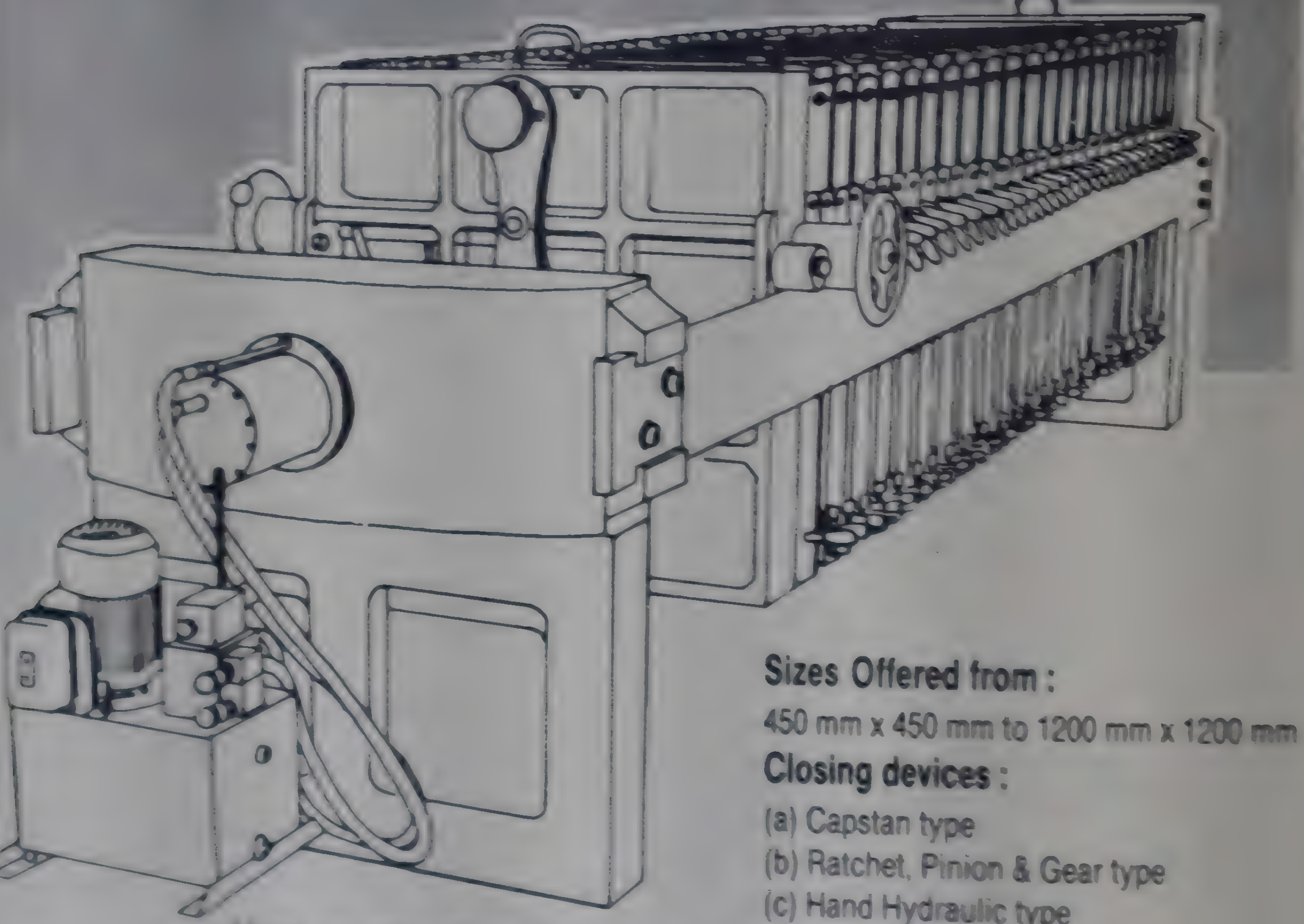

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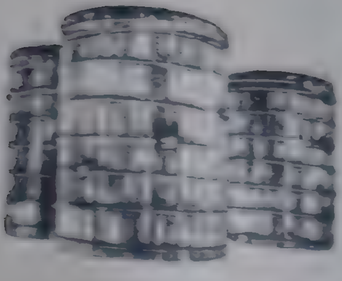

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THE PIONEERS IN THE FIELD

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The author who is at the helm of affairs in the FAI, has traced the growth of the fertilizer industry in India right from its inception to the present status. The projected requirements for consumption which are expected to grow faster than indigenous production and emerging global situation, call for commensurate increase in installed capacity. The author stresses the need for a pragmatic fertilizer pricing policy.

ertilizer Sector in India -- The Emerging Scene*

PRATAP NARAYAN
Executive Director, The Fertiliser Association of India, New Delhi.

WN ERA

independence in 1947, Fertilizer Industry in India onal existence with only a few super phosphate , the first of its kind with a capacity of 6,400 tonnes annum established in Ranipet, Tamil Nadu in he great Bengal famine in 1943 and subsequently, food imbalance in the wake of partition led the ment to recognise the need for growing more food stematic and planned basis. Simultaneously, the ce of fertilizers in this endeavour was beginning lised and the first large Ammonium Sulphate plant ri was commissioned in 1951.

AL IMPETUS

l the late 50s there was no significant addition to particularly in the nitrogenous sector. During the with agriculture getting top priority in India's Third ear Plan (1961-62 - 1965-66) and more so, from mid when the devastation caused by the drought for two in succession highlighted the need for giving a big to Indian agriculture based on improved productiv- ncrete plans were drawn up to add substantially to nous fertilizer production capacity in the country. This recognition of the key role played by fertilizers in the best out of the high yielding variety technology was being tried around the same time (and in par- with the dwarf variety of hybrid seeds for wheat ed from Mexico in the early sixties), aimed at improv- ricultural productivity. Quite apart from the heavy ments made in setting up nitrogenous plants in the sector owned by the Government, a number of plants also set up in the private sector including EID-Parry ras in 1963, GSFC, Baroda and CFL, Vizag both followed by IEL, Kanpur and SFC, Kota in 1969.

The oil crisis in the early seventies and consequent problems of procuring required quantities of fertilizers from abroad related to both availability and higher prices, imparted further momentum to the process of building up indigenous production capabilities. A number of plants were commissioned mainly in the public and the cooperative sector, based on a wide array of feedstocks including coal and fuel oil (as against naphtha being the primary feedstock for plants commissioned in the sixties), arising out of the need to fruitfully exploit available reserves of coal on the one hand, and minimising outgo of foreign exchange on the other.

1980s: MAJOR STRIDES

The 80's witnessed further acceleration in addition to fertilizer capacity and production being the result of large size plant based on newly found reserves of gas in the Bombay High and the South Bassein region on the one hand, and consistent improvement in capacity utilisation rates of existing plants on the other. Between 1980-81 and 1987-88, the installed capacity for nitrogen increased by 63% from 4.6 to 7.5 million tonnes while in phosphates, it went up by 95% — from 1.3 to 2.5 million tonnes. The increase in production during the same period from 2.1 to 5.5 million tonnes N has been much higher at 162%. In phosphates, the increase from 0.8 to 1.8 million tonnes was of the order of 172%.

It is clear that besides additions to capacity, the impetus to indigenous production has also come from significant improvement in the capacity utilisation rates. In the nitrogen sector, the national average increased from 53% in 1980-81 to 79% in 1986-87 while in phosphates, it went up from 65% to 80% during the same period. With a total installed capacity of 7.5 million tonnes nitrogen and 2.6 million tonnes phosphate and the observed levels of capacity utilisation rate which are quite commendable by interna-

---

presented at the meeting of the FAO/World Bank/UNIDO Work- p on Fertilizers, 27-30, June 1988, Vienna.

tional standards, India has the distinction of being the fourth and the fifth largest producer of nitrogen and phosphate respectively in the world.

NARROWING GAP

The development of Fertilizer Industry in India has enabled an increasingly large quantities of fertilizer requirements being met from domestic production. While consumption continued to grow at a rapid pace from a meagre 0.3 million tonnes of nutrient (NPK) in 1960-61 to 5.5 million tonnes in 1980-81 and nearly 9 million tonnes for 1987-88 (provisional), the gap between domestic production and consumption has also narrowed down over the years. In fact, between 1980-81 and 1986-87, the lowering of the gap as percentage of consumption from 39% for N and P taken together (K requirements being entirely met from imports due to absence of raw material base supporting domestic production, has been excluded) to about 10% clearly reflects the increase in self-sufficiency in fertilizer availability facilitated by increasing domestic production.

PLANS AHEAD

(a) Production

In order to meet the challenge of increases in fertilizer consumption in the years ahead, additional capacity is being created besides enabling the existing units to do better in terms of increased capacity utilisation through measures such as debottlenecking, rehabilitation, modernisation and provisioning for captive power facilities etc. In this endeavour apart from the two gas based plants at Thal and Hazira of 1.5 million tonnes of urea capacity each already commissioned in the first year of the Seventh Five Year Plan i.e. 1985-86, two more projects based on the gas available from HBJ pipeline, one each in the public and cooperative sector, have already been commissioned and one more plant in the private sector is expected to go on stream shortly. Three more projects based on this gas apart from the one in the South at Kakinada, Andhra Pradesh are under execution and expected to be completed in the next three years.

In the phosphatic sector, the addition to capacity has been brought about through an ambitious programme involving hree coastal plants and 4 expansion projects based on mported phosphoric acid. Of the new DAP projects, the GSFC, Sikka, Hindustan Lever, Haldia and Godavari Fertilizers, Kakinada have already been commissioned. Besides he expansions of MCF and SPIC which have already been mpleted, two others presently under implementation by NFC, Bharuch and Deepak Fertilizers, both nitrophosate, are expected to be commissioned within two years.

In addition, a project using available resources of pyri with a total capacity of 33,000 tonnes of P_2O_5 per ann is coming up at Amjhore, Bihar. The proposed additio in both the sectors, will lead to a total installed capac of 11.5 million tonnes by 1989-90 consisting of 8.4 m lion tonnes N and 3.1 million tonnes P.

(b) Consumption

The planning with regard to consumption has to a ce tain extent, been vitiated by the experience in the rece past. Starting from Rabi 1984-85, for almost 7 seasons succession, the weather conditions have been unfavourab resulting in a lower level of consumption in relation to t targets. It would thus be seen that since 1983-84, when Ind achieved a record consumption of 7.7 million tonnes (nutrients), there has not been any perceptible increase durir the last four years. Recognising the indomitable role weather, 70% of the cultivated area being under rainfed co ditions, the Planning Commission in its mid-term appra sal, have revised the target of consumption from 13.5 14 million tonnes envisaged earlier to 12 million tonnes fo the terminal year of the Seventh Plan i.e. 1989-90. Whi this by itself may appear to be an exacting task, estimate production at 8.7 million tonnes by 1989-90 would still b inadequate in relation to the requirements thus indicatin dependence on imports.

In the above context, it also needs to be emphasised tha the additions to production capacity within the country par ticularly during the Seventh Plan, has not been at a pac originally contemplated. In fact, as per current reckoning three of the gas based projects proposed along the HBJ pipe line are likely to slip into the Eighth Plan period and com mence production from 1991-92. This has been the resul of a combination of factors including the environmental con straints preventing speedy clearance, difficulties in mobi lising resources and also to a certain extent, an uncertair pricing policy environment.

SOME GLOBAL DIMENSIONS

This apart, concrete plans for additional capacity during the 8th Plan period i.e. 1990-91 to 1994-95 and beyond have not been drawn up as yet as the Government is currently taking a fresh look at the policy with regard to management of the supplies to meet increasing fertilizer consumption. In particular, the question of planning availability on the basis of what is known as 'make versus buy' option with emphasis on the latter, is being considered. While it may take some time before a final view is taken by the Government, it may be necessary to assess various and cons of this approach particularly in the context : emerging global trends with regard to availability and rice.

ssentially there are three dimensions to the issue:

. Global demand-supply balance
. Price trends
. Availability of Foreign Exchange

Demand-Supply Balance

The global availability situation which was quite com- table during the first half of 80s, has already become tight ticularly in respect of urea as reflected in the difficul- being faced by the major buyers including China, Phi- pines and countries in the South America in procuring ir needs from the international market. The tightness of ply is expected to continue in the immediate future as ilability from both the Eastern block and Arab Gulf pro- cers will continue to be restricted in view of commit- nts already made to China and Latin America etc., thus ving little surplus to accommodate additional demand, ny. In fact, the likely trend is reinforced by the predom- ating presence of China which after having already con- cted for 2.2 million tonnes of urea during the first half 1988, is expected to continue its buying spree consid- ing its ambitious foodgrain production target which in the ent past, i.e. 1985 and 1986 could not be reached for want adequate availability of fertilizers arising out of lower ports besides reduced domestic production.

This apart, the World Bank/UNIDO/FAO projections also int towards an increasingly tight availability situation as flected in an estimated shortage of nitrogen at the global vel by over 1 million tonnes by 1990-91. The slippage the commissioning of the three new gas based projects ong the HBJ pipeline in India referred to above, would ean a still higher short supply. The situation could become en more difficult in the event of Eastern block countries rticularly Russia, significantly increasing their internal nsumption and the likely delays in creation of new capac- ies in the developing countries caused, amongst others, financing problems. In any case, there is not much of idence of ammonia capacity being built on a significant ale worldwide thus clearly reflecting on the likely pro- pects of fertilizer availability in the 90s.

. Price Trends

The fertilizer prices in the international market respond argely to the changing demand-supply balance at the global level. The declining trend which started in the early 80s continued until the later part of 1986 when the prices crumbled to as low as $67 per tonne (FOB) urea and $125 per tonne (FOB) DAP. Since then however, these have been on a rising trajectory following entry of China in a major way even though India did not import during 1987-88 but for some marginal quantities under the contractual agreements. During the course of 1987, urea and DAP prices had already increased by $30-35 per tonne and $70-80 per tonne respectively. The rising trend has continued even during the earlier part of 1988 and if some of the recent contracts signed are any indication, the urea priced in the world market have reached as high as $140 per tonne (FOB). On the basis of projected demand-supply gap into the 90s, it is clear that the prices in the international market would tend to escalate still further.

c. Foreign Exchange Constraint

The foreign exchange availability against the backdrop of an extremely difficult balance of payments situation is too important to be ignored. Apart from the repayment obligation to the IMF which will be of the order of Rs.1,300 crores each during 1988-89 and 1989-90, the overall foreign exchange situation will continue to be under strain in view of substantially increased imports of crude oil, petroleum products, oil seeds etc. In addition, increased import of capital goods, raw material and components, being the logical outcome of liberalisation in Export-Import Policy is expected to impose additional demand on foreign exchange. Needless to mention that the unprecedented drought of 1987-88 and the import needs arising as a result, will necessarily receive top priority entailing huge foreign exchange outgo.

TOWARDS SELF-SUFFICIENCY : THE KEY GOAL

It is clear that the import option could be a risky proposition whether one views it from the angle of global availability and concomitant price trends, or from the view point of availability of foreign exchange reserves. In this context, it may be worth reiterating India's policy towards fertilizer sector as reflected in the Sixth and the Seventh Five Year plan documents. In the nitrogen sector, the policy prescribes maximum degree of self-sufficiency in fertilizers based on utilisation of our own raw materials including feedstock, leaving only marginal quantities to be met through imports. In phosphates however, the domestic raw material constraints do not permit near total self-sufficiency in production. Recognising this, the Government has adopted a conscious policy mix involving domestic production based on indigenous rock phosphate and imported rock phosphate [illegible] production aided by imported intermediates i.e. ammonia and phosphoric acid and import of DAP in the third option. Through the first two alternatives, the intention has been to achieve nearly 75% self-sufficiency in phosphatic fertilizers which not only prevents too much of exposure to the uncertainties in the international market, but also helps in utilising to the extent possible, our own resources besides contributing to industrial development and employment generation etc.

CHEAP IMPORTS: A MIRAGE

In view of the above, the need to continue the policy followed hitherto i.e. adding to indigenous production capability cannot be overemphasised. However, in the recent past, certain doubts have surfaced regarding the desirability of this option particularly in view of the high cost of domestic production. The cost of production vis-a-vis imports may apparently tend to be higher in selected years. However, this somewhat simplistic assessment may lead to a highly misleading conclusion. The lower prices in earlier part of 80s and 1986 in particular, were essentially the result of global excess availability which amongst others, was caused by increased domestic production in developing countries including India. The prices have already started firming up which trend is likely to continue in view of projected short supply at the global level. It is, therefore, unrealistic to assume that the comparative advantage will continue with the imports. Secondly, the cost of inputs including feedstock to fertilizer producers in India are substantially higher than their counterparts abroad. The price for natural gas charged to fertilizer industry in India is nearly 2.5-4 times in USA, 2-3 times in Western Europe and nearly 4-6 times in countries of Middle East, Eastern Europe and Indonesia. Thirdly, an overwhelming share of production in India is from newly commissioned plants and expansion projects as against predominantly old depreciated minimal capital related plants abroad. Fourthly, there is also the factor of high domestic prices (nearly 2-3 times) in exporting countries which enable lower prices being charged on exports through cross-subsidisation. Making correction for some of these factors, the farmgate price for a plant to be set up abroad similar to a newly commissioned plant in India and even assuming gas price of $1 per million Btu will be around Rs.4,300 per tonne urea (World Nitrogen Survey, April, 1987) which is significantly higher than the retention price plus freight paid to Thal and Hazira. T go up to Rs.3,400 per tonne if gas were to be pric per million Btu being the price charged current and Hazira.

In view of the above, there is no sound justif any worry on account of the apparent high cost of tic production which can in fact be brought down competitive level through realistic pricing of inp ing feedstock besides lowering interest rates and taxe are also substantially higher in India than in the ex countries. How important is the role of prices of inp be seen from the experience of the Fertilizer Indu Japan largely based on imported naphtha, fuel oil and which during the course of 80s, has become progres un-competitive due to increasing energy prices lead substantial decline in production. While in Japan, the r energy prices were absolutely beyond control leadi rationalisation of capacity accompanied by reduced pro tion, in India, adequate reserves of natural gas, the en ing dominant feedstock, as also the fact that the pric all inputs including feedstock to fertilizer industry in are administratively controlled by the Government, it is possible to keep the prices within the reasonable limit in turn, ensure reasonable cost of production of dom fertilizers.

CONCLUSION

The projected requirements for consumption whi expected to grow faster than indigenous production on a conservative basis, as also the emerging glob uation in respect of both availability and the price call for commensurate increase in installed cap Towards this end, there is urgent need for planning in advance particularly in view of long gestation pe involved in commissioning of new large sized pro Besides planning for additions to capacity in the Eig and beyond, the need for expeditious implementatio projects already committed in the Seventh Plan ca be overemphasised. Needless to mention that a favo environment and in particular, the pricing policy as clearly laid down role of indigenous production v imports is a necessary prerequisite for realising the go continued self-reliance in Indian agriculture bas increased fertilizer use.

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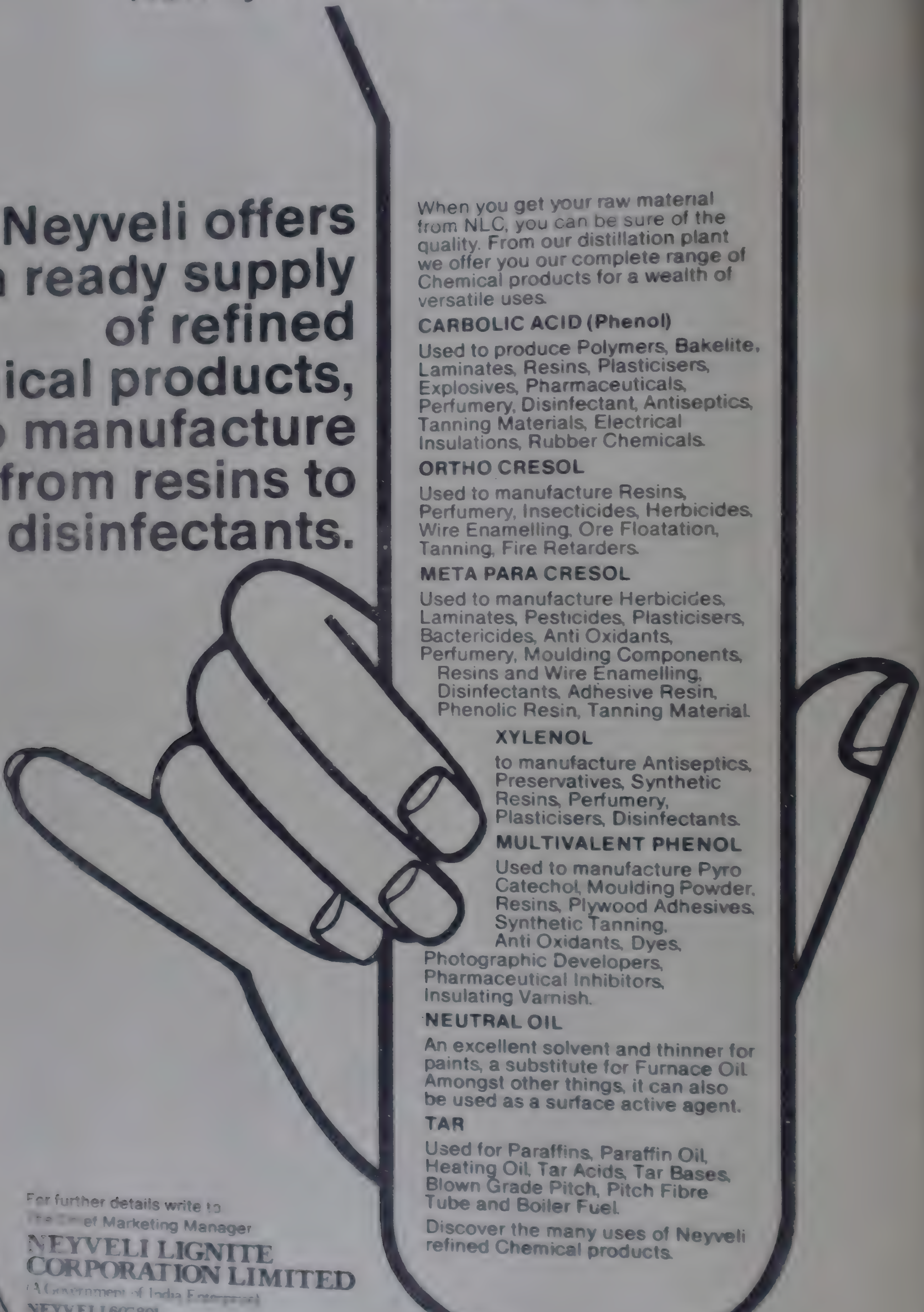

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Beginning with a small SSP factory at Ranipet in Tamil Nadu, India today produces a variety of multinutrient fertilizers. The country is the fourth largest consumer of nitrogenous and phosphatic fertilizers. The author, an expert in fertilizer industry, urges the Government to reconsider its fertilizer policy in view of anticipated increased consumption. The Government should have strong political will to do away with subsidy. The author cites the US example.

Fertiliser Industry -- Its Prospects & Pitfalls

N.G. ASHAR*

to the Crude Oil Production, the Government of taches great importance to the development of the er Industry. This is to ensure, timely and in adequate y, the availability of this key input for the devel- t of Agriculture.

annual report of 1987 by the Department of Ferti- eflects a record increase in the fertiliser production for the year 1986-87. Nitrogenous fertilisers up by 35% from 43.28 lakh tonnes to an estimated 51.75 lakh tonnes, (actual 54.122 lakh tonnes see table I) and phosphatic fertiliser up by 15.55% from 14.28 lakh tonnes to an estimated 16.50 lakh tonnes (actual 17.75 lakh tonnes given in table I). Significantly, there has been a continuous effort to develop indegenous capability to provide engineering, construction and knowhow for the new fertiliser projects.

TABLE - I

All India production target, production & stocks of N & P_2O_5 February 1988, March ('88 & 87) and April-March (1988 and 1987)

('000 tonnes)

	1988		1987	# % variation in March 1988			
	February	March**	March	over March 1987	1987-88*	1986-87	# % variation
OGEN (N)							
rget for production	490.1	514.2	452.3	13.7	5,600.0	5,175.0	8.2
oduction	500.1	525.3	510.3	3.1	5,466.0	5.412.2	1.0
a) Straight Fert	424.7	442.7	1.2	4,763.7	4,763.7	4,635.6	2.8
b) NP/NPKs	75.4	84.2	73.6	14.4	702.3	776.4	-9.5
osing Stock@ (Silo + filed warehouses)	1,904.8	2,215.7	1,883.2	17.7			
pacity Utilisation	83%	85%	89%		78%	79%	
SPHATE (P_2O_5)							
rget of Production	185.7	204.7	182.5	26.0	2,100.0	1,775.0	18.3
duction	159.7	185.1	148.6	24.6	1,665.0	1,661.9	0.2
a) Straight Fert.	23.4	29.0	20.6	40.8	400.2	321.0	24.7
b) NP/NPKs	136.3	156.1	128.0	22.0	1,264.8	1,340.9	-5.7
osing Stock@ (Silo + field warehouses)	340.6	443.8	618.6	-28.3			
pacity Utilisation	80%	91%	89%		72%		

[illegible] the manufacturers

umulative April 1987-March 1988 includes figures for April 1987-February 1988 and provisional for March 1

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The production capacity of fertiliser in the country has increased from 0.85 lakh tonnes of nitrogenous and 0.63 lakh tonnes of P_2O_5 in 1951-52 to 67.42 lakh tonnes of nitrogenous and 20.23 lakh tonnes of P_2O_5 in 1986-87. A large expansion programme of 15 projects; eight nitrogenous and seven phosphatic is in the pipe line to achieve the 7th plan target by 1990 of 10 million tonnes of N_2 and 3 million tonnes of P_2O_5 fertilisers, an almost 100 times and 50 times increase in N_2 & P_2O_5 capability in 40 years!

In addition to the net growth in production, begining with a small SSP factory at Ranipet in Tamilnadu, India today produces a variety of straight and multinutrient fertilisers. The chronology of progressive sophistication is given in Table II.

TABLE-II
Chronology of the Production of fertiliser materials in India*

Year when first produced	Material	Unit manufacturing as on Oct. 1, '86
1908	Single superphosphate	71
1906	Fertiliser mixtures	577
1933	Ammonium sulphate	14
1933	-- byproduct of steel industry	6
1941	-- using sulphuric acid	3
1947	-- using gypsum	5
1959	Ammonium sulphate nitrate	0
1959	Urea	28
1959	Ammonium chloride	5
1960	Ammonium phosphate	2
1961	Calcium ammonium nitrate	2
1965	Nitrophosphate (30% WS)**	1
1967	Diammonium phosphate	7
1968	Triple superphosphate	3
1968	Urea ammonium phosphate	4
1968	NPK complex fertilisers	4
1973	Pelophos	0
1979	Urea supergranules	*
1980	Urea ammonium nitrate solution	*
1986	Polyphosphate	*
1988	Partially acidulated phosphate rock	*
1989	Nitrophosphate (80-85% WS)	**

* Total pilot scale production facilities for experimental purposes
**One of the two grades (20-20-0) later upgraded to 50-60%WS P_2O_5

India has now attained the fourth largest consumer position of N_2 and P_2O_5 nutrients and is the fourth and fi largest producer of the same respectively. (see Table III p. 113). Unfortunately there is no K_2O (Potash) availa in the country but India has to balance its fertiliser in and ranks 7th in consumption. It is interesting to note consumption has increased in real terms and larger perce age of World consumption is shared by India.

Thirty years ago (1955-56) nutrient input was only Kg/ha which rose to 5.1 Kg/ha in 10 years. Ten years a it was 16.9 Kgs/ha and in 1985-86 it has crossed 50 Kg/ in terms of 33.7 Kgs Ns 12.0 Kgs P_2O_5 and 4.9 Kgs K_2

As regards pricing to the farmer, it is interesting to co pare the cost of inputs against procurement prices announc by the Government. A comparison is made between 19 and 1987 and we all know that the recent announceme that the procurement prices of agricultural outputs increased but the fertilisers remain at the old price whi is heavily subsidised.

At current prices the cost of N based on Urea is Rs.5. Kg and for P_2O_5 based on SSP is Rs. 5.94/Kg. P_2O_5 bas on DAP is slightly cheaper at Rs.5.88/Kg. Direct use timely ground rock phosphate costs Rs.3.50/Kg of P_2

At the prevailing procurement prices of foodgrains it tak 3.50 Kgs paddy or 3.15 Kgs of wheat to buy one Kg N a 3.99 Kg paddy or 3.60 Kg of wheat to buy one Kg of P_2 (as DAP). Economics of fertilisers application or respo ses required for a given value : Cost ratios can be work for regional situation based on prevailing delivered pric and yield responses. By and large the response ratios of 8- for N & P_2O_5 are profitable to the farmer giving 2-3 tim return.

Since 1981 till date the prices of fertilisers have changed. A comparison of the relation between 1981 an 1987 as to the quantity of Rice and Wheat required to pa for 1 Kg of nutrient is given in Table IV. It can be see that there is a room for 20 to 30% buffer in fertiliser price based on 1987 procurement prices. The same will be highe at the recently announced higher procurement prices.

The years 1987-88 witnessed the worst drought of th century, preceeded by continuing drought for over two year in certain parts of the country, resulting into a virtual stan still condition of fertiliser industry. The Government wa not ready to take the risk to take any policy decision to ups the present market forces which may endanger the agricultural pattern of cultivation, should there be wide spread rains

TABLE - III

Changing rank of India in Production and Consumption of Fertilisers in the World

ic	1974-75 N	 P_2O_5	 K_2O	1984-85 N	 P_2O_5	 K_2O
production (mt)	42.51	27.06		74.26	37.03	
production (mt)	1.10	0.33		3.92	1.34	
rank	10th	19th		4th	5th	
consumption (mt)	38.00	23.92	19.86	70.51	4.27	25.89
s consumption (mt)	1.77	6.47	0.34	5.33	1.91	0.81
s rank	4th	12th	13th	4th	4th	7th
World consumption	4.6	1.8	1.7	7.6	3.1	3.1

TABLE - IV

Comparison of nutrient prices and the quantity of rice and wheat required to pay for 1 kg nutrient in 1981 and 1987

s	1981	1987	% changes 1987 over 1981
of N as urea (Rs./kg. N)	5.11	5.11	0
of P_2O_5 as DAP (Rs./kg. P_2O_5)	5.83	5.83	0
of K_2O as MOP (Rs./kg. MOP)	2.17	2.17	0
of paddy (Rs./kg.)	1.05	1.50	+43
of wheat (Rs./kg.)	1.30	1.73	+33
paddy needed to buy 1 kg. N	4.87	3.41	-30
paddy needed to buy 1 kg. P_2O_5	5.55	3.89	-30
paddy needed to buy 1 kg. K_2O	2.07	1.45	-30
wheat needed to buy 1 kg. N	3.93	2.95	-25
wheat needed to buy 1 kg. P_2O_5	4.48	3.37	-25
wheat needed to buy 1 kg. K_2O	1.67	1.25	-25

: June 1988.

ortunately the rains so far have been good or a bit over- e and the prospects seem to be bright. The fertilisers been the King Pin in the growth process. Its increasing combined with a scientific farm management, has led uch needed per hectare yield and overall improvement gricultural productivity.

s per Planning Commission's estimate, food grains pro- tion must increase to about 235-240 million tonnes to a projected population of 1 billion by 2000 A.D. at existing nutritional standards. To facilitate this the fer- er consumption should be increased from 9 million nes to 2 million tonnes by the turn of the century.

n short, one million tonnes per year additional capacity created in the next decade.

Against this background, the Government should reconsider its fertiliser policy. The "Varadarajan Committee" set up by the Government suggested an option to buy in International market versus making. This has come in the light of a fall in international prices and the indigenous industry clamouring for higher and higher quantum of subsidies. Fertiliser Association of India, the chief spokesman of the fertiliser industry in India has always forwarded the argument that the talk of free market, dual prices, parity with import prices, demand of removal of subsidy, etc will kill the fertiliser industry. Against this line of approach which the policy makers in Delhi always thought right and bought in totality, last year large discounts were offered by one and all fertiliser manufacturers in public and private sector and made a mockery of subsidy policy of the Government. FAI immediately called a Board Meeting, pulled up some of its members and status quo was retained to the benefit of vested interests. Actually many fertiliser units have diversified their activities and are no longer dependent for more than half of their turnover in fertilisers alone.

It is quite disturbing that the Indian Government still treats a Giant Industry like fertiliser with investment of over Rs.25,000 crores and output of more than Rs.5,000 crores, as an infant industry and wants to baby it by props and crutches. Instead, what the Government can seriously consider, is to give major inputs like fuel, natural gas, naphtha, rock phosphate, freights at lower administered prices in line with international prices. This would reduce the artificial large margins shown by Indian Oil, ONGC, Mining Corporation, MMTC etc. which are Government units. For new investments, the incentive is not in giving higher subsidies, as made out by the fertiliser industry, but to give preferential rates of interests, investment allowances, tax concessions etc. Thus one can consider giving a new direction by cutting altogether a burden on the tax payer, of over Rs.2,000 crores per annum.

A serious thought be also given to joint ventures in the Middle East countries with specified prices and quantum of off-take by Indian market using, available cheap capital and raw materials. The indigenous plants based on natural gas be allowed to generate power for their captive use and also feed to the state or National grid during slackness of demand, thereby maintaining uniform consumption of gas and sustain economic viability.

Subsidy of any sort, when perpetuated due to political reason by Government or vested interests or gains by the disbursing bureaucracy, breeds corruption and complacency. The classic example of this is the farm subsidy given by the U.S.A. Government. It requries enough political courage and foresight, to do away with these kinds of parisitic measures at the opportune time. Otherwise, when the stakes are high and snow balled subsidy crosses staggering sums, when removed summarily, it would give such a jolt to the Fertiliser industry, that it would take years to recover out of the shock. For the recent new projects, management circles are quoted advising its officers to artificially jack up capital costs in order to attract higher subsidy which is directly related

A recent phenomenon is the case of the turnover and e
tax imposed by Government of Gujarat. Ultimately it
to yield to the pressures of trade and industry. On the o
hand the corrupt officers of municipalities in Maharas
have been successful in stalling the Government deci
to abolish the octroi levy on May 1, 1988, thus Mahara
tra could not fall in line with the national policy for be
efficiency and healthy economic growth by removing wa
ful way of collecting levy. Last year the leaders of ag
tion against octroi were naive enough to believe the C
Minister of Maharashtra and ultimately a just and nec
sary measure has now become a victim of corrupt polit
The states which took into the measure of removing oc
with conviction timing it right, are benefited and are ha
sustained industrial growth.

Likewise, to have a vital and essential industry such
Fertilisers, a deeper thought be given to the case of s
sidy and consider only the healthy factors that would g
a boost to the industry as well as usage of larger quant
of agricultural inputs, instead of sustaining and perpetu
ing adhocism.

In conclusion one can only hope of government re
sation that time has now come to reconsider a compreh
sive and healthy policy, to promote faster growth of
fertiliser industry.

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The faith in technology developed and used abroad and the lack of it in indigenous research ability became a habit of the mind that inevitably led to lack of enterprise in R & D efforts in this country, the authors opine. The R & D sector of the Indian Chemical Industry cuts a poor figure when compared to other developed countries. The chemical industry in India would do well to realise this truth, invest substantially in R & D, say the authors.

Shape of Things to come -- in Corporate R & D

S.H. IQBAL and K.R. SRINIVASAN
Division of Technical Services, National Chemical Laboratory, Pune.

the chemical industry in India is like a child trying to d unsteadily on its feet and take the first few steps, R) in chemical industry is like an infant in its cradle. mical industry as a part of Indian industrial empire, ori- ed to large scale production of a variety of essential micals, is hardly four decades old, although it can be med that it has a historical past dating back to the late teenth century. Still further and further back there were ances of essential commodities, many of which can be sified as chemicals, being produced by artisans and other led workers. But production of a commodity on a scale which they are undertaken in modern times was restricted agriculture. There were two reasons for this; the pop- tion was limited and distributed all over the country, so t local artisans could produce the few things that were eded by the small communities of which they were part; d the material needs of the people were few. The con- mer boom was still ages away.

The industrial revolution that overtook the West and anged the lifestyle of the people within a century dras- ally had no influence on India and its people. Keeping ce with the West, one of the motivating forces that quick- ed the pace of industrialization in India, became evident ly after the country gained its Independence. The engine- s, the inventors, the businessmen, the managers, the sci- tists and others who were responsible for this industria- tion took to their profit-motivated ventures with gusto l never looked back. It is to these people that we owe e highly developed industrial base in the country.

But, if the industrialization in the West was firmly rooted new inventions and in an insatiable urge to adapt and nprove, industrialization in India was based on borrow- g and adapting. In no other field of industrial enterprise as this more evident than in the chemical industry. The ndustry from its very beginnings leaned heavily on bor- owing technologies cast away by the industrialized countries. Although, on the face of it this approach may appear to be unforgivable, there was one valid reason why this had to be so. India started late, and so, to set the industry firmly on its feet, it was necessary to adopt readily-available technologies. Research leading to new inventions is a time-consuming endeavour.

But the faith in technology developed and used abroad and the lack of it in indigenous research ability became a habit of the mind that inevitably led to lack of enterprise with regard to R & D. As late as 1984, a prominant industrialist was reported as commenting that carrying out R & D on industrial processes was like reinventing the wheel. This comment epitomizes the attitude of industry towards developing up its own technologies. From the industry's point of view, it was far better to buy technologies, even if they were outdated, than to develop one's own technologies, and this view was mingled with the cynical belief that what was discarded by developed nations was good enough for our country.

It is not therefore surprising that in-house R & D in the chemical industry was virtually unknown. The task of developing technologies was left to the national laboratories. The relationship between the chemical industry and the federal supported laboratories swayed from unconcealed suspicion to total trust. There were industrialists who refused to credit the laboratories and the scientists with an ability to develop up-todate processes; these were unwilling to admit that commercially viable processes were available in the laboratories, for such an admission would have prevented them from importing technologies. There were, on the other hand, some enlightened industrialists who were willing to join hands with the scientists in the R & D labs, and they benefitted by the association. An easy and fruitful relationship between the federal R & D labs and the industry is now in the offing because of the heigh[illegible] ness in the industry of the importance of R [illegible] however wishes that this relationship had been established much earlier.

This awareness has resulted in a few industrial organisations setting up their own R & D facilities and taking up development work seriously. This is a far cry from the early days of the chemical industry when the so-called R & D labs, set up in response to the tax concessions introduced by the Government, were used mainly for testing and trouble shooting. Only multinational organisations took R & D seriously in those days, but the fruits of research conducted in their R & D labs were reaped by the parent companies abroad. A scientist who had worked in one such R & D laboratory once said that as soon as any finding was made in the laboratory, it was transmitted to the parent organisation in England and stored in the central computerized information bank.

R & D in chemical industry with its unimpressive record has, however, a lot to look forward to. The chemical field elsewhere is replete with new processes and new products. More are being added almost every day. The R & D units and the organisations in India would do well to carry out a survey of what is currently happening in the developed countries, analyse it in the context of India's demands and future needs and arrive at a suitable research strategy. It must be remembered here that if the chemical industry decides to continue to adhere to its earlier policy of looking to the West and Japan for technologies, it would find itself in difficult straits as the developed nations will not readily part with their state-of-the-art technologies for many new products. There is, therefore, no alternative to organising and conducting research on new technologies indigenously in right earnest.

In the following paragraphs we have made an attempt to provide pointers to a few new areas of research in chemical industry.

Pollution Control and Alternative Non-Toxic Materials

Pollution and its ramifications have been neglected by the chemical industry for a long time. It is now no longer possible to shove this important twentieth century phenomenon to the background and carry on with manufacturing and marketing as though these two activities alone count. We have already paid a heavy price for its neglect at Bhopal and other places.

The focus should be on safer newer generation and less toxic pesticides, biological control agents and other agrochemicals. Controlled release, as a technique aimed at reducing environmental toxicity, is yet to be investigat throughly in India, and industry, as yet, has paid only sca attention to it.

An allied field is the development of safer pesticides f use at home and in heavily populated areas. Pesticide banned elsewhere as unacceptably toxic, are still in use India and this situation cannot continue for long. Indust must come to grips with the problem and try to find viab solutions.

Energy from Biomass

Normally industry would not look in this area for ar profitable venture. This is an area where enthusiastists wit out much of a research background have done a lot of wor but researchers have tended to neglect it. Use of bioga however, continues to be minimal. In the meantime, heap and heaps of biodegradable wastes have been accumula ing everywhere. Actually, treating waste to produce energ has been pursued as a profitable venture in the advance countries. With considerable R & D inputs, production c biogas can become less messy and more profitable.

Alternatives to Halocarbons

Chlorofluocarbons used for pressurizing spray formula tions (cosmetics, pesticides, etc.) have been found to b mainly responsible for the depletion of the ozone layer tha protects the earth from harmful ultraviolet radiation fron the sun. The use of halocarbons is being severely restricte in western countries. India has so far been indifferent t the possibility of a global calamity caused by severe ozon depletion. Research is underway in advanced countries o halocarbon substitutes. The likely candidates are fluorocarbon-123 ($CH\,Cl_2\,CF_3$), fluorocarbon-134a (CH FC F_3) and fluorocarbon-141b ($CH_3\,CCl_2\,F$). The hydrogen atoms in these compounds make them susceptible t degradation in the lower atmosphere so that no reactiv compound reaches the ozone layer. Synthesis of these and even better compounds should not be beyond the abilitie of our organic chemists.

Surfactants and Detergents

Although quite a few of these chemicals are used by the textile and other industries, there are quite a few new compounds to be added to this category. Research needs to be carried out in India on all the four types, viz. anionics, cationics, nonionics and amphoterics. The use of chemicals like alkylphenyl ethoxylates, fatty or oxo-alcohol polyethylene glycol ethers, ethylene oxide-propylene oxide ers, fatty alcohol polyglycol ethers and alkyl betaines o be introduced or extended in industry. The scope & D in the field is wide and calls for additional R nputs. There is a need to look for detergents with more ficity than currently encountered in the products avail- in the market.

gs

his is an area in which all the drug companies should l together their resources and establish a common earch facility. This is because discovery of new drugs xtremely expensive and beyond the scope of a single & D laboratory. A lot of research can also be carried out more economic routes to established drugs. Drug devel- ment no longer depends only on expertise in organic syn- sis. Biotechnologists have already made quite a few ntributions in this field and it is necessary for any R & organisation in drug industry to have first rate biotech- logists as well as organic chemists on its staff. Some of biotechnology products that are being tested for use as ugs are:

- a trial natriuretic factor (a peptide hormone for use as a diuretic and antihypertensive agent)
- epidermal growth factor (agent for promoting epidermal cell growth, used in the treatment of wounds and burns)
- erythroprotein (a peptide hormone that stimulates the production of red blood cells and hence useful in the treatment of dialysis associated anaemia)
- factor VIII (blood clotting factor)
- fibroblast growth factor (agent for stimulating growth of new blood vessels and hence useful in the treatment of wounds, burns and as a skin graft)

Many more products are being developed and unless esearch in this area is started with utmost speed, India will oon lag far behind developed nations, and continue to mport vital new drugs.

Yet another area in which research effort will yield very gratifying results is controlled drug release technology. At present a patient has to be administered a drug in a dose far in excess of the requrired dose as most of it does not reach the site where it is required to act. This excess dose often leads to complications. Site specific drug delivery is the answer to this, and considerable research is being carried out in developed countries in this new area.

Biotechnology Products

Biotechnology products, other than those used in medicine, are made by traditional as well as new methods. The high volume products in this category are industrial enzymes used in food and fermentation industries. Some of the more important ones are:

* enzymes for starch conversion (used in food and fermentation industries)
* proteases (used primarily as stain removing detergents)
* rennin (used for processing milk and cheese)

Most of the industrial enzymes are produced by the submerged culture of microorganisms.

Among the products obtained by the new genetic engineering techniques are :

* genetically engineered bacteria/viruses for plant pest/-disease control
* enzyme catalysts (such as rennin produced from yeast)

Natural sources can also yield a variety of fungicides, fertilizers and other agro products. The area of biotechnology calls for large investments in R & D, but the returns are also expected to be high.

Advanced Materials

Research on advanced materials is carried out in India only in CSIR laboratories (like NCL, Pune), ISRO, The Indian Institute of Science, and the BARC. No serious work is being conducted in the corporate R & D laboratories. Yet this is an area in which corporate R & D can make enormous contributions. Many of the advanced materials are polymer based, ceramic based and metal based. Of the three, the first two fall within the scope of the R & D laboratories in chemical industry. Some of the materials on which intense research work is required to be carried are:

* thermoplastic resins used in the computer and electronics industries
* high-impact polystyrene and modified polyphenylene oxide
* high performance fibres for defence and industrial uses (boron, carbon, aramid, silicon carbide and aluminium oxide fibres, polyimide and sulfar fibres)
* other fibres in woven and non-woven applications (polyphenylene sulphide fibre, bicomponent polyethylene polypropylene fibres and polybenzimidazole fibre)
* polymers used in structural composites (PBZ, a new family of heterocyclic rigid rod and chain extended polymers with high tensile strength and thermal stability)
* polymer composites (filled, laminar ("sandwiched") and fibre reinforced types)

- ceramic composites, like BSZ (partially stabilized zirconia which retains its high temperature structure at room temperature)
- ceramic fibres
- silicon carbide monofilaments (used to improve the strength and high temperature performance of metals and alloys)
- metal containing flame retardant polymers

This is a field in which the corporate R & D laboratories may complement the work carried out in laboratories under federal agencies.

Isocyanates

Isocyanates are used in producing urethane chemicals and cast elastomers. Technologies are required to be developed for aliphatic isocyanates (m-tetramethyl xylylene diisocyanate, TMXDI, m-isoprophenyl dimethylbenzyl isocyanate, TMI) using the nonphosgenation route. At present only federal laboratories like NCL are active in this field.

Other Polymers

Other polymers on which the R & D sector of the chemical industry can carry out work with great profit are:

- synthetic rubbers (styrene-butadiene; carboxylated styrene-butadiene; polybutadiene; ethylene-propylene diene; polychloroprene ; polyisoprene and others)

- biodegradable packaging materials for use as substitutes for conventional plastics.

Metal Clusters

This is an exciting new field that promises to yield many novel catalysts. 700 varieties of clusters are known, which have common structures comprising mostly transition me atoms arranged in a typical closely packed pattern, or fra ments of arrays of metal atoms formed via multicent bonds. An example is the family of metal carbonyl clus ers. Their use as alternative catalysts in Fischer-Tropsch sy thesis is being investigated in the U.S. and other countri with great interest. In India, however, it is again the feder laboratories that have shown interest in the area, with pra tically no inputs from the R & D units of the industry

Conclusion

There are many, many more areas to which the R & labs of the chemical industry can turn their attention. The have a more crucial role to play than just being places whe strictly product-profit-oriented research is carried out. If th chemical industry desires to take R & D seriously at al it must look deep into the future. It must evolve a strateg based on the concept of technology transfer to other cour tries, and not to the stale practice of importing worn-ou technologies. It must scan the widening horizon in front c it and pick out the regions in which it can effectively cor tribute. The US Congressional Committee which recentl reviewed the USA-Japan science exchange programm observed that the American scientists who visited Japa under the programme were taken around the universit laboratories, but kept away from the R & D laboratorie of the private companies, which is where the real work goe on. The R & D laboratories of about a dozen or so firm are the ones that have pushed Japan to the forefront of inter national business and industry. Surprising as it may appea it is in these laboratories that more and more basic researcl of a high quality is being carried out. In comparison, th R & D sector of Indian chemical industry cuts a poor figure This sector has a stake not only in the industry's progress but also in the nation's progress. The chemical industry ir India would do well to realize this truth, invest substantiall in R & D, and organise its research priorities judiciously

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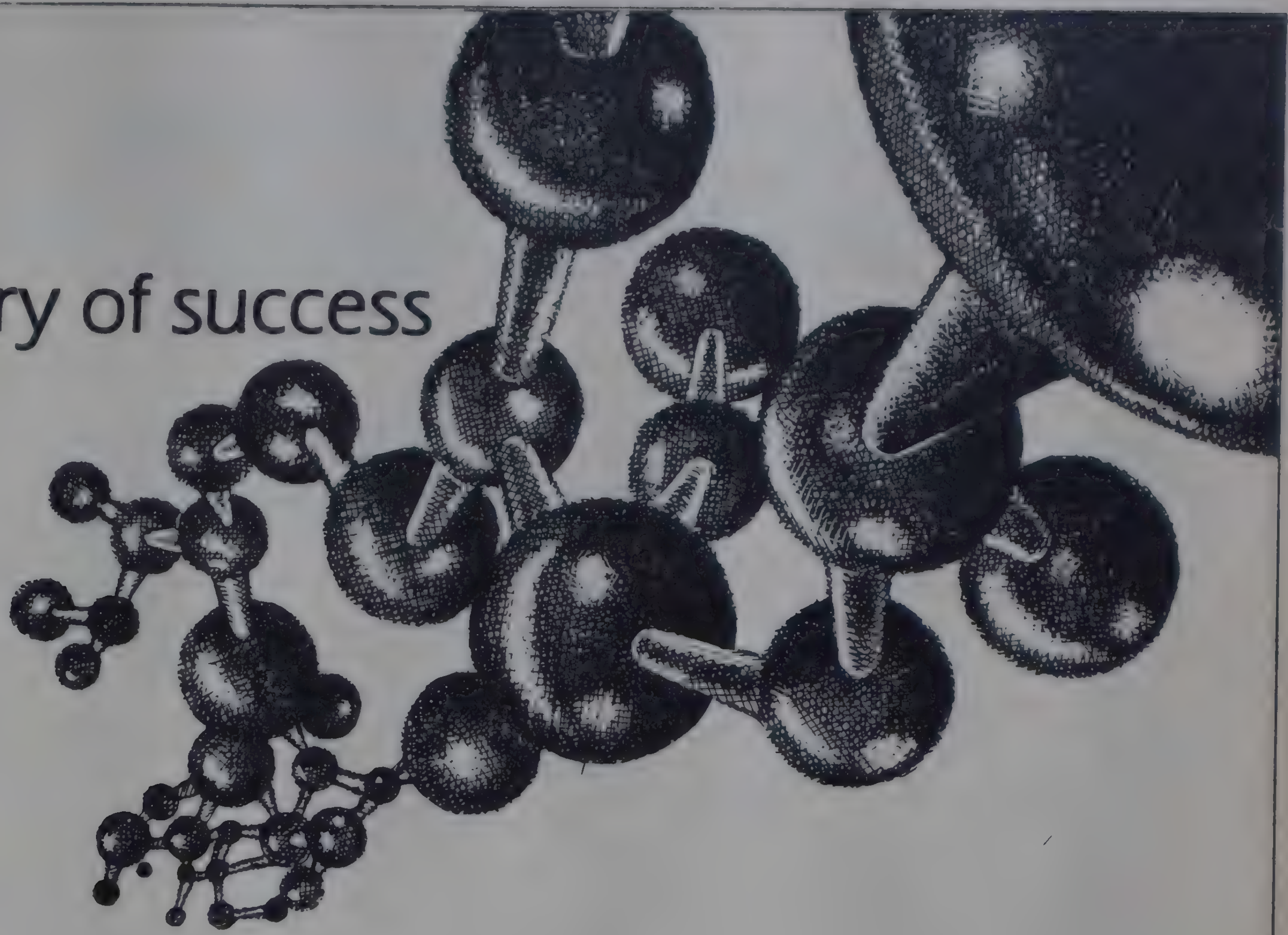

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With a view to maintaining speedy growth of the Drugs and Pharmaceuticals industry, the Government announced various measures for rationalisation and also amended the Price Control Order. The growth in the petrochemicals sector was recorded on all fronts; consumption up 12% over the previous year, production keeping pace with expansion of capacity and new projects moving as per schedule, and a systematic long range effort by Government to identify the demand/supply scenario upto 2000 AD. The organic and inorganic chemicals sector also witnessed a rapid growth.

Annual Survey of Chemicals and Petrochemicals (1987-88)

ODUCTION

e Department of Chemicals and Petrochemicals under
inistry of Industry is entrusted with the responsibility
nning, development, regulation of chemicals, petro-
icals and pharmaceuticals industry sectors of the econ-

e Department under the charge of Shri R.K. Jaichan-
ingh, Minister of State for Chemicals & Petrochem-
(upto 17.2.1988) and Shri H.K. Khan as Secretary of
Department continued to oversee the production of
icals -- both organic and inorganic, petrochemicals and
ed the availability of quality medicines including the
tial and life saving drugs at reasonable prices.

HLIGHTS

e highlights of the year in Drugs and Pharmaceuti-
Petrochemicals and Chemicals sector are:

GS & PHARMACEUTICALS

he production of drugs and pharmaceuticals continued
ow an increasing trend. The production of bulk drugs
formulations during 1987-88 is estimated to be of the
of Rs. 480 crores and Rs. 2,350 crores respectively.

he present production covers a wide range of bulk drugs
uding antibiotics, vitamins, hormones, sulpha drugs and
st of other synthetic, phyto-chemicals and biological
ducts. A number of new drugs like Pyroxicam, Ranit-
e and Norfloxacin etc. have been introduced in the recent
t.

The trend of increasing production in a large number of
ential drugs was maintained during 1987-88.

n December 1986, Government announced 'new measures for rationalisation, quality control and growth of pharmaceutical industry in India'. The new measures are directed towards the speedy growth of this industry in the desired areas of essential drug production and in conformity with the health needs of our people during the years to come.

To enable drug manufacturing units in the country to achieve economies of scale, minimum economic capacities in respect of certain drugs were announced. A number of drugs have been put under the scheme of delicensing to facilitate their production in the country in required quantities.

During 1986-87, 36 Letters of Intent were issued in favour of Indian companies. None was issued in favour of FERA companies. Total number of Industrial Licences issued was 25 including 5 issued to FERA companies. During this period 162 DGTD registrations and 58 delicensing registrations were granted. The number of foreign collaborations approved during 1987 is 15.

Consequent upon the announcement of the new measures for rationalisation, quality control and growth of pharmaceutical industry in the country, the new Drug Price Control Order was announced in August 1987 to stimulate production of drugs and pharmaceuticals in the desired areas and make the price control system more effective.

PETROCHEMICALS

Petrochemicals can be broadly categorised as follows:

1. Plastics (such as low density and high density polyethylene, commonly known as ldPE and hdPE, polypropylene and polyvinyl chloride which are commonly known as PP and PVC).

2. Synthetic Rubbers (such as styrene butadiene rubber and polybutadiene rubber, which are commonly known in the

abbreviated form of SBR & PBR).

3. Synthetic Fibres (such as nylon, polyester and acrylic).
4. Intermediates (such as ethylene, propylene, benzene, DMT, caprolactum etc.) which in turn are used in the manufacture of various petrochemical items.

Petrochemicals are manufactured from petroleum feedstocks like naphtha and gas and also from alcohol and calcium carbide. At present naphtha is the dominant feedstock in our country. Natural gas is presently not being used for production of petrochemicals. However, a major petrochemical complex being set up in Maharashtra (in Nagothane) will be based on natural gas as its feedstock. The cyclic availability of alcohol combined with periodical changes in the levy of excise duty renders the alcohol route for petrochemicals undependable. Similarly, the use of calcium carbide for the manufacture of petrochemical products such as PVC is constrained by the fact that this route is energy intensive.

The manufacture of various petrochemical products is generally a three or four tier process. The main raw materials required to manufacture plastics are ethylene and propylene, which are generally produced from naphtha or natural gas. For synthetic rubbers, the main raw materials is butadiene which can be obtained from naphtha or alcohol or from gases from secondary processing of heavy ends of crude oil. For synthetic fibres, the main raw materials are: caprolactum for nylon, DMT/PTA for polyester and acrylonitrile for acrylic fibre. For caprolactum, benzene is the main raw material whereas for DMT/PTA, xylenes and for acrylontrile propylene are required. These raw materials are again obtained from cracking or processing of naphtha, natural gas and gases from secondary processing units.

The year 1987-88 has been quite promising for the petrochemical industry on all fronts eg. consumption, production and other developmental activities.

CONSUMPTION

1. The consumption achievement of plastic raw material is estimated to be 12% higher compared to 1986-87, despite hardening of global prices as well as availability and also despite duty revision effected twice once at the time of Budget and again in September, 1987.

2. Despite constraints, the Government made efforts to [illegible] supplies specially for ldPE/lldPE and IPCL/ [illegible] to [illegible] 51000 tonnes in order to assist ensuring supplies to the small sector units which constitute about 90% of the total tic processing industry.

3. In the case of synthetic fibre/yarn industry also, do tic availability has increased by more than 30%.

PRODUCTION

4. The high level of production of plastic raw mate in 1986 is expected to be maintained during 1987 The ldPE production however was adversely affe due to closure of two plants, viz. Union Carbide IEL.

5. IPCL (a Public Sector Undertaking) achieved succ ful mechanical completion of their P.P. Co-Poly plant with a capacity of 25,000 tonnes. With this, self-suficiency would be achieved for this versatile p tic raw material.

6. The progress of implementation of gas based pe chemical complex, viz. MGCC at Nagothane (M rashtra) again being implemented in the Public Se by IPCL, is as per schedule.

7. The production of PSF which was around 60,000 to in 1986 is expected to reach a level of 80,000 to in 1987. Similar is the position for PFY where pro tion in 1987-88 is expected to be around 100,000 to compared to 80,000 tonnes in 1986-87.

8. The PSF plant of BRPL, a Public Sector underta is almost mechanically complete and productio expected to commence during the year 1987-88.

9. In view of the demand/supply situation for PSF PFY, the Government has for the first time permi exports of PSF and PFY to the extent of 30,000 to and 5,000 tonnes respectively.

10. In addition to the production level of 22,000 tonne acrylic fibre (AF), IPCL has successfully completed expansion project of AF for an additional capacity 12,000 tonnes/annum. This plant is expected to commissioned during the year 1987-88.

11. RIL has mechanically completed their PTA plant a capacity of 100,000 tonnes/annum. When this p is commissiioned shortly, the country is expected only to attain near self-sufficiency with regard to main raw material for polyester industry but would save foreign exchange to the extent of about Rs. crores at full capacity utilisation.

f LAB, a detergent raw material has also substan- gone up in 1987 even though the country is pas- through serius drought situation. We were so far ly dependent on imports. However, with success- ommissioning of 2 new units, viz. TPL and RIL, nstalled capacity has increased from 30,000 tonnes 50,000 tonnes/annum, requiring no imports in 1988 also thus saving considerable amount of foreign hange.

otable development in the plastic industry has been availability of multi-layer plastic film which is used packaging of various food items. Another important ature during 1987 has been the setting up of polyester m plants by M/s. Ester India, Polyplex and Flow- ore. With the commissoning of these plants in 1988, gh quality polyester film would become indigenously ailable and would provide an important input for eeting industry's needs for audio/video tapes required the electronics sector, besides meeting the special- ed packaging needs of the country.

ER DEVELOPMENTAL ACTIVITIES

Government has drawn up a long-term growth oriented perspective plan of the complex petrochemicals industry up to 2000 AD identifying the demand/supply scenario as also various steps required to be taken in the areas of feedstock availability, technology alternatives, fiscal measures, etc. for overall systematic & integrated development of this industry. This plan would help in adopting policy initiatives in the right direction.

A Petrochemicals Data Service (PDS) scheme has been finalised and PDS is to be set up shortly under the aegis of IPCL. This would provide all the feedback data/information to facilitate Government decisions.

IPCL in the Public Sector, besides implementing a number of energy saving schemes, has launched their Enclilite Xylofining Catalyst through its R & D efforts in collaboration with NCL and ACC. Similarly, NCL has developed an acrylonitrile based on polymer which has the properties of absorption of a large quantity of water and has application in the field of agriculture.

The polyester chips required for the polyester industry were earlier required to be produced by the entrepreneurs captively. Merchant sale of chips has now been permitted to enable the user industry to plan for their units based on bought-out chips. This would lead to growth of polyester industry without running the viability risk of chips plant.

18. Government has sanctioned 5 Extension Centres of th Central Institute of Plastic Engineering and Technology (CIPET) in different parts of the country not only to meet the increasing requirements of trained manpower for the plastic processing industry but also to lay special emphasis on use of plastic in various sectors such as automobiles, electronics, housing, agriculture and water management.

19. Nine Plasticulture Development Centres (PDCs) in Agriculture, Irrigation and Industrial sectors have been set up in 1987, in addition to such PDCs sanctioned earlier in different parts of the country. These centres would help development of plastic application in agriculture. Some of the plastic applications are Drip Irrigation, Green Housing, Mulching, Canal Lining, CAP Cover, Milk Pouches, etc.

20. In view of the growing economic relevance of the petrochemicals industry, themes on plastics and rubber were developed and exhibited in the 1987 Trade Fair for the first time. The themes vividly brought out the developments achieved so far and also the vast potential available for exploitation in these two areas. This evoked tremendous interest both from the entrepreneurs and users.

The exports of Drugs & Pharmaceuticals during 1985-86 and 1986-87 have been of the order of Rs. 265 crores and Rs. 222.96 crores, respectively. The Department is laying great emphasis on the export of drugs and pharmaceuticals. A perspective plan for 15 years has been drawn up to further increase exports of drugs and pharmaceuticals.

The total imports of bulk drugs, intermediates, chemicals and solvents, etc. increased from Rs. 267.40 crores (CIF) in 1985-86 to Rs. 287.59 crores in 1986-87.

GROWTH OF THE PETROCHEMICAL INDUSTRIES

Production of basic petrochemicals in India made a modest beginning at a comparatively late stage during the 1960s. A small Naphtha Cracker having a modest capacity of 20,000 tonnes/annum for the production of ethylene was set up in 1966, followed in 1968 by a somewhat larger naphtha cracker having a capacity of 60,000 tonnes/annum for the production of ethylene. Both these units were set up in the Private Sector in Bombay area, first by Union Carbide and second by National Organic Chemical Industries Ltd. Prior to that, a small quantity of petrochemicals (mainl plastic resins and intermediates) were being produced based on the raw material viz. alcohol, coal tar intermediates, calcium carbide, etc.

Recognising the expanding use of petrochemicals and its importance on the social and economic structure in the country, Government has been promoting the growth of petrochemical industry. The major thrust in this field was made for the first time in 1978 when a naphtha cracker having a capacity for production of 1,30,000 tonnes/annum of ethylene was set up in Baroda by the Indian Petrochemicals Corporation Ltd. (IPCL), a Public Sector Undertaking of the Government of India. By now a wide range of petrochemical products have been developed in India. Substantial increase has been achieved over the recent years in the production of petrochemicals which are categorised as thermoplastics, synthetic rubber, synthetic fibres and intermediates.

Production -- Sixth Five Year Plan

The production performance of petrochemicals during the Sixth Five Year Plan has been as below:

(Production '000 tonnes)

Item	1980-81	1984-85	% increases
Thermoplastics and Synthetic Rubber			
LDPE	87	107	23
HDPE	24	39	62
Polypropylene (PP)	17	27	59
Polystyrene (PS)	10	16	60
Polyvinyl Chloride (PVC)	42	83	100
SBR	19	22	16
PBR	6	17	183
Synthetic Fibres			
Nylon Filament Yarn (NFY)	21	33	57
Polyester Fil. Yarn (PFY)	11	56	410
Polyester Staple Fibre (PSF)	22	39	77
Acrylic Fibre (AF)	10	21	110
Intermediates			
Dimethyl Terephthalate	23	27	17
Caprolactum	13	16	23
Acrylonitrile (ACN)	9	20	122
Mono Ethylene Glycol	12	23	92

Production -- Seventh Five Year Plan

The production of major petrochemical items during 1986-87, the anticipated production in 1987-88, target for 1988-89, the terminal year of the Seventh Five Year Plan are indicated in the Table on next page.

The production of various petrochemicals during 19 thus continues to show an improving trend over the duction in 1986-87. The production of synthetic fibre getted to increase by 12% from 2,45,000 tonnes to 2,7 tonnes. The production of PFY is likely to go up by during the year 1987-88.

In order to ensure that the industry grows in the grated perspective and long-term dependence on im to meet the growing needs of the country is obviated number of petrochemical complexes planned to be s and other intiatives taken are indicated in latter part o report.

PLAN PERFORMANCE

The production targets of major petrochemicals an performance achieved there in 1986-87 with antici production achievements in 1987-88 are indicated i table below:

C = Capacity; P = Production '000

	1986-87 Targets C	**1986-87 Targets** P	**1986-87 Achievements** C	**1986-87 Achievements** P	**1987-88 ticip Produc**
Thermoplastics & Rubber					
ldPE	122.0	90.0	122.0	88.0	80
hdPE	30.0	62.0	50.0	41.0	36
PP	30.0		30.0	23.5	27
PS	26.0	16.0	26.0	19.0	19
PVC	141.0	110.0	133.0	124.0	115.
PBR	20.0	17.0	20.0	15.5	14.
SBR	30.0	28.0	30.0	24.0	26.
Synthetic Fibres					
PSF	111.1	87.0	88.0	64.0	85.
PFY	57.3	70.0	64.0	80.0	105.
NFY	37.4	34.0	41.0	34.0	38.
NIY/TC	22.3	20.0	21.0	24.0	24.
AF	20.0	18.0	22.5	23.0	22.
Intermediates					
ACN	24.0	22.0	24.0	23.0	26.
Caprolactum	20.0	18.0	20.0	18.0	18.
DMT	139.0	105.0	135.0	97.0	115
PTA					
LAB	30.0	28.0	[illegible]	[illegible]	40.

Production -- Seventh Five Year Plan

(C = Capacity; P = Production) ('000 MT

	1986-87 Actuals		1987-88 Targets		1987-88 Likely Achievements		1988-89 Targets	
	C	P	C	P	C	P	C	P
noplastics & Rubber								
	122.0	88.0	122.0	88.0	122.0	80.0	122.0	80.0
	50.0	41.0	50.0	36.0	50.0	36.0	50.0	38.0
	30.0	23.5	55.0	33.0	55.0	27.0	55.0	40.0
	26.0	19.0	26.0	20.0	26.0	19.0	26.0	22.0
	133.0	124.0	133.0	115.0	133.0	115.0	133.0	125.0
	20.0	15.5	20.0	17.0	20.0	14.0	20.0	17.0
	30.0	24.0	30.0	26.0	30.0	26.0	30.0	28.0
hetic Fibres								
	88.0	64.0	188.0	120.0	180.0	85.0	212.0	127.0
	64.0	80.0	64.0	90.0	68.0	105.0	71.0	130.0
	41.0	34.0	49.5	38.0	49.5	38.0	49.5	42.0
/TC	21.0	24.0	29.5	24.0	29.5	29.0	30.0	26.0
	22.5	23.0	34.5	22.0	34.5	22.0	34.5	30.0
ermediates								
N	24.0	23.0	30.0	26.0	30.0	26.0	30.0	26.0
rolactum	20.0	18.0	20.0	20.0	20.0	18.0	20.0	18.0
IT	135.0	97.0	135.0	115.0	135.0	115.0	135.0	125.0
A	--	--	--	--	--	--	100.0	120.0
B	30.0	30.5	130.0	45.0	130.0	40.0	150.0	120.0

ODUCTION OF BULK DRUGS AND RMULATIONS

The production of drugs and pharamceuticals continued show an increasing trend. The production from 1982-83 wards was as follows:

Year	Bulk Drugs (Rs. in Crores)	Formulations (Rs. in Crores)
1982-83	345.00	1660.00
1983-84	308.27	1760.00
1984-85	364.63	1827.00
1985-86	409.12	1945.00
1986-87	457.60	2140.00
1987-88 (Est.)	480.00	2350.00

The production targets of selected essential bulk drugs ring 1986-87 and 1987-88 and their production during 85-86, 1986-87 and 1987-88 (estimated) are given in the atistical Section. The present production covers a wide range of bulk drugs including antibiotics, vitamins, hormones, sulpha drugs and host of other synthetic phytochemical and biological products. A number of new drugs like Pyroxicam, Ranitidine, Norfloxacin, etc. have been introduced in the recent past.

The import of the following bulk drugs was very nominal/nil in 1986-87:

I. Antibiotics
- Chloramphenicol Powder.

II. Sulpha Drugs
- Sulphadimidine
- Sulphacetamide sodium
- Sulphamethiazole
- Phthalyl sulphathiazole
- Sulphaguanidine
- Sulphanilamide

III. Vitamins
- Vitamin 'C'

Nicotinic acid
Nicotinamide
Vitamin 'B'
Vitamin 'E'
Vitamin 'K'

IV. **Analgesics, Antipyretics, etc.**
Oxyphenyl butazone
Aspirin

V. **Anti-T.B. Drugs**
PAS and its salts
Ethambutol

VI. **Anti-Malarials**
Amodiaquin
Chloroquin Phosphate

VII. **Anti-Diabetics**
Chloropropamide
Tolbutamide
Insulin

VIII. **Anti-Histamines**
Diphenhydramine

IX. **Tranquilizers and Sedatives**
Diazepam

X. **Anti-Helmentics**
Clofazimine

XI. **Immunological Agents**
Triple Vaccine
Diptheria Anti-toxin.

GENERAL

The trend of increasing production in a large number of essential drugs was maintained during 1987-88. To enable drug manufacturing units in the country to achieve economies of scale, minimum economic capacities in respect of certain drugs were announced. A number of drugs have been under the scheme of delicensing to facilitate their production in the country in required quantities.

During 1986-87, 36 Letters of Intent were issued in favour of Indian companies. None were issued in favour of FERA companies. Total number of Industrial Licences issued was 25 including 5 issued to FERA companies. During this period 162 DGTD registrations and 58 delicensing registrations were granted. The number of foreign collaborations approved during 1987 is 15.

LEVIES AND DUTIES ON DRUGS DURING THE YEAR 1987-88

Exemption of excise duty on patent and proprietory medicines based on 76 life saving and essential drugs was co tinued. 22 drug intermediates also continued to attra concessional rate of customs duty of 25%. 3 intermediate required for the production of anti-TB and anti-leprotic dru Rifampicin were totally exempted from customs duty. Th list of items enjoying countervailing/excise duty was con tinued for 84 items during the year.

DRUG PRICES EQUALISTION ACCOUHT

The Supreme Court in an important judgement in April-May, 1987 upheld the powers of Government to fix pric for drugs under the Drugs (Prices Control) Order. As a resul various companies are required to pay the difference i prices charged by them and the prices fixed by the Government into the Drug Prices Equalisation Account. So fa an amount of Rs. 2.28 crores has been recovered from thes companies and action to recover the balance amount is being vigorously followed up.

DILUTION OF FOREIGN EQUITY

When the New Drug Policy was announced on 29th March, 1978, there were 31 FERA companies with direct foreign equity exceeding 40%. Since then 23 companies have diluted their foreign equity share to the levels up to or below 40%. One foreign company has merged with an Indian company and become non-FERA. Presently there are only 8 FERA companies in the Drug Sector.

IMPORT OF TECHNOLOGY

In the field of drugs and pharmaceuticals, during the year under review (up to December 1987) foreign collaborations for the following items have been approved:

1. Rifampicin
2. Vitamin-C/Sorbitol
3. Nifedipine
4. Phenylglycine
5. Cephalosporins
6. Immobilized Enzymes 6 APA & 7 ADCA
7. Gentamycin
8. Sodium Ampicillin

CHEMICALS, PESTICIDES AND ALLIED INDUSTRIES

The last few years have witnessed a rapid growth in the field of chemicals industry both organic and inorganic. Heavy organic and inorganic chemicals provide the basic building blocks for the manufacture of several down-products like drugs, dyestuffs, pesticides, plastics, etc.

eralised licensing policy has over the years encouraged g up of medium scale units under the automatic reg- on procedure. The small scale units are being given ıate encouragement by reserving a number of chem- for exclusive development in the small scale sector. capacity and production of chemical industries during ears 1986-87 and 1987-88 are given in the Statistical ion.

hemical Industry is highly technology oriented and a ıber of incentives have been given to the industry to mote R & D activities. The National Laboratories under CSIR, particularly the NCL, the Regional Research oratory at Hyderabad, Jammu and Jorhat are also aged in promoting R & D activities.

GANIC CHEMICALS

A brief review of major organic chemicals is given below:

enol

The major use of phenol is in manufacture of phenolic sins, bisphenol-A (which is required for epoxy resins) and rious intermediates for pesticides, drugs, petroleum refin- g and lubricating oil. At present there are two major man- acturers of phenol namely M/s. Herdillia Chemicals Ltd. ith a capacity of 15,000 tonnes and M/s. Durgapur Chem- als with a capacity of 6,600 tonnes per annum. In order improve the availability of phenol in the country, Gov- nment has issued a licence to M/s. Hindustan Organic hemicals Ltd. (a Public Sector Undertaking under the dministrative control of the Ministry of Industry) for a apacity of 40,000 tonnes per annum and commercial pro- uction at their plant has commenced. Government has also ssued a Letter of Intent to M/s. Gujarat Industrial Invest- nent Corporation for a capacity of 15,000 tonnes per nnum. With the establishment of these plants the availa- lity of phenol will fully meet the requirements.

ethanol

Methanol is an important raw material for the manufac- ure of formaldehyde, DMT and various methanol deriv- atives like methylacrylates. It is also used as a general olvent and gas purifier and denaturant for alcohol. The resent installed capacity for methanol is 81,000 tonnes, dis- ributed among four units, viz. M/s. Rashtriya Chemicals & Fertilisers Ltd., with a capacity of 37,500 tonnes and M/s. Assam Petrochemicals with a capacity of 7,000 tonnes have been producing to their full capacity. The other two new units namely Nangal Unit of National Fertilizers Ltd., with a capacity of 16,500 tonnes per annum and a unit of Gujarat Narmada Valley Fertilizers Corporation with a capacity of 20,000 tonnes per annum have also gone into production, thus boosting the indigenous production and reducing imports considerably. Production in 1986-87 was of the order of 78,200 MT and is estimated to be 80,500 MT in 1987-88. One more unit, namely M/s. Rama Petrochemicals with a capacity of 60,000 TPA is expected to come into production in March 1988. Even after commissioning of this unit, some imports will continue till additional capacity of G.N.F.C. is commissioned in 1989-90.

Acetone

Acetone is a basic chemical used in the manufacture of drugs, rubber chemicals, etc. It is also used as an important solvent. The present installed capacity is 35,000 MT distributed among six manufacturers. Further approvals, involving a total capacity of 24,640 tonnes, based on alcohol and petro feedstock have been approved to meet the estimated demand of 52,000 tonnes in 1989-90. The production of acetone was 26,691 MT during 1986-87 and is expected to be at the same level during 1987-88. With the commissioning of acetone plant of HOC, we have not only reached self sufficiency but also have exportable surplus.

Acetic Acid

Acetic acid is used in the manufacture of vinyl acetate, acetic anhydride and a number of organic chemicals. The present installed capacity of 19 plants is 80,740 metric tonnes per annum. Further approvals for a capacity of 15,600 TPA have been given to meet the estimated demand of 57,245 tonnes by 1987-88. The production of 45,681 tonnes of acetic acid in 1986-87 is more than the production in 1985-86. Additional demand is for vinyl acetate monomer.

Acetic Anhydride

Acetic anhydride is used in the manufacture of cellulose acetate, acetic esters, drugs, pesticides, dyes intermediates, perfumery chemicals, etc. The present installed capacity of acetic anhydride is 28,070 TPA distributed among eleven plants. Further approvals involving a capacity of 2,650 tonnes per annum have been given to meet the estimated demand of 20,825 tonnes by 1987-88. The production of acetic anhydride was 14,899 tonnes during 1986-87.

Alcohol

Ethyl alcohol (industrial alcohol) is an improtant raw material for many chemical industries such as acetic acid, acetic anhydride, acetone, butanol, butyl and ethyl acetate, polyethylene, styrene, PVC and synthetic rubber.

The long awaited revision of prices of alcohol and molasses has taken place effective 1.10.87 which has been acclaimed by all including alcohol based chemicals industry. While revising the prices of alcohol, adequate relief to this industry has been extended by allowing full rebate of central excise duty on molasses.

So as to ease the situation of availability for industrial purposes the Central Government has recently relaxed the ban on manufacture of alcohol for potable purpose from sources other than molasses. This is expected to increase the overall availability of alcohol substantially and will increase the supplies of cheaper molasses based alcohol to industrial units.

During the alcohol year 1986-87 (December, 1986-November, 1987) the total availability of molasses was 42.582 lakh tonnes against the consumption of 32.561 lakh tonnes. The availability of alcohol (including carry over stocks) has been 9084.22 lakh litres and the utilisation at 8259.79 lakh litres during 1986-87. The availability being much more than the demand thereof, Government permitted export of 500 lakh litres of alcohol outside the country.

DYES AND DYE INTERMEDIATES

A large variety of dyestuff and dye intermediates are being produced in the country. These include basic dyes, disperse dyes, reactive dyes, dyes for food industry, optical whitening agents for polyester fibre, special leather dyes and dye intermediates.

The indigenous production of dyestuffs is sufficient to meet the demand of textile/consumer industry and only a very small percentage of sophisticated types of dyes, hitherto not manufactured in the country, are being allowed for import. A large quantity of dyes and dye intermediates are being exported and valuable foreign exchange is earned. The production of dyestuffs during 1986-87 in the organised sector was around 20,529 tonnes which is comparatively low on account of industrial relation problems in some of the dye-manufacturing units as well as a general inertia in demand in the textile industry. Production in 1987-88 is likely to be better than last year.

INORGANIC CHEMICALS

The inorganic chemicals industry is an important sector of the economy. The major inorganic chemicals are soda ash, caustic soda, carbon black, calcium carbide, red phosphorus and potassium chlorate. A review of these chemicals is given below-

Soda ash

The present installed capacity of soda ash is 10 tonnes distributed among six plants located in differ of the country. Additional capacity to the extent o lakh tonnes has been sanctioned to meet the future d

Production of soda ash in 1986-87 was 9.83 lakh and this was the highest production ever achieved previous financial year. The expected production in 1 is likely to be more than this against the estimated d of 10.50 lakh tonnes. The demand is increasing nec ing marginal imports. Availability position is compar easy in the current year. Government has delicense ufacture of soda ash (Standard Solvay process) to e age indigenous production. M/s. Gujarat Heavy Che Ltd. has been commissioned with a capacity of 300 leading to self sufficiency in soda ash.

Caustic Soda

There are 39 companies producing caustic soda country with an installed capacity of 9.92 lakh tonnes actual licenced capacity of 10.78 lakh tonnes per a Recently two more units with a total licensed capa 53,000 TPA have come into commercial production ing the existing installed capacity to the level of 10.4 TPA. Further approvals totalling annual capacity o lakh tonnes have been granted to meet the future de The production of caustic soda in 1986-87 was 7.4 tonnes as against the demand of 7.95 lakh tonnes. In to encourage indigenous production, Governmen recently canalised imports of caustic soda. Product 1987-88 is expected to be of the order of 8 lakh t

Carbon Black

Carbon black is one of the important raw materials in the manufacture of rubber products such as tyres and rubber goods. There are, at present, seven units en in the manufacture of carbon black with an approved c ity of 245,000 tonnes per annum. However, the pr installed capacity is only 1.55 lakh TPA. Additional c ity to the extent of 78,100 tonnes has been approve meeting future demand. The production of carbon bla 1986-87 was 96,776 tonnes and it is expected to excee last year's level.

Calcium Carbide

At present, in the organised sector, the installed capa of calcium carbide is 2.19 lakh tonnes among 11 units. ever, out of this, three units totalling an annual capac 54,000 tonnes are closed for the time being due to p abour problems, etc. Additional capacity to the 8,560 tonnes has been granted to meet the future The production of calcium carbide during 1986-87 592 tonnes. Production is further expected to be 75,000 MT during 1987-88.

osphorous

phosphorus is an essential raw material for the man- of safety matches which is an item of mass con- on. There are two units with an installed capacity of onnes per annum. Major production is from M/s. Phosphorous Pvt. Ltd., Vapi. Production of red phos- s in 1986-87 was 1,126 tonnes and it is expected to 00 tonnes in 1987-88 against a demand of 1,570

ium Chlorate

assium chlorate is used in the manufacture of safety es. Another application is in the preparation of fire rs. It is also an intermediate raw material for the man- re of perchlorate. At present there are 13 producers assium chlorate having an installed capacity of 24,950 s per annum. Additional capacity to the extent of 2,950 s per annum has been sanctioned making in all 27,900 s. The production of this chemical in 1986-87 was tonnes and is expected to be 10,000 tonnes in 1987-88.

TICIDES

sticides include insecticides, fungicides, weedicides, ticides, etc. Pesticides are consumed in agriculture and c health. Pesticides industries have made steady pro- during the last three decades. Today more than 57 nical grade pesticides are manufactured in the country. e than 126 insecticides have been approved for use in country.

rty seven units are currently engaged in the manufac- of technical grade pesticides and over 500 units are ng formulations. As a result of the increased produc- of pesticides in the country, import of technical grade ides have come down substantially. A large number ditional approvals have been granted during the year e manufacture of later generation pesticides such as etic pyrethroids and wheat weedicides. Imports of pes- e formulations are generally not permitted.

e demand for pesticides is gradually picking up. The ent installed capacity for pesticides in the country is 00 MT. Production and capacity of technical grade pes- es during the last three years has been as under:

(in tonnes)

Year	Capacity	Production
1984-85	099,122	58,376
1985-86	102,328	54,919
1986-87	097,100	56,260

Details of production of major items in technical grade pesticides during 1986-87 and 1987-88 are as under:

(in '000 tonnes)

Items	Actual Production in 1986-87	Estimated production in 1987-88
BHC	25.4	26.0
DDT	08.1	10.0
Malathion	02.7	03.5
Other Pesticides	20.0	23.2

With a view to ensuring equitable distribution of pesticides, the supply of selected technical grade pesticides to non-associated formulators is made through State Governments based on quarterly allocations made by the Ministry of Agriculture. In this connection, certain guidelines to assist basic manufacturers and formulators have been laid down.

At present there is no control on the prices of pesticides. However, manufacturers are required to keep Government informed of their prices and whenever there is any increase, they are required to furnish full particulars justifying such increase.

EXPORTS

There has been a sizeable increase in exports of chemicals during the last two years as the following figures suggest:

(Rs. in crores)

	1985-86	1986-87
Basic Inorganic & Organic Chemicals including Agro-Chemicals	61.9	66.2
Dyes, Intermediates, Alcohol & Coal Tar Chemicals	46.0	98.7

For the current year 1987-88 a target of Rs. 200 crores has been fixed for these chemicals. The Department is reviewing product-wise figures of exports and the problems and supplementation of inputs with the manufacturers and concerned agencies. Special steps are being taken to boost the exports during the next two years by simplifying procedures and making important inputs available at international/reasonable prices so that the end products for export will become competitive in the world market.

The procedures for registration of pesticides for export purposes are being streamlined and clearances are being given expeditiously by Government. The list of items for inclusion in the category of "deemed exports" under Annexure II of Appendix 19 of the Import Export Policy is being considered for expansion in order to encourage local technical grade pesticides manufacturers in the country to participate fully in the export promotion effort. The prospects for export of pesticides are tremendoes and it may grow to about Rs. 80 crores from the present Rs. 35 crores in the next 2 years. It alone is expected to cross Rs. 50 crores in the current year. Similarly, exports of all the above categories of chemicals may go up to Rs. 300 crores by 1989-90 if planned efforts bear fruit.

BHOPAL GAS LEAK DISASTER

After the filing of the case by the Government of India against Union Carbide Corporation (UCC) in the Court of the District Judge, Bhopal for claiming compensation for the victims of the Bhopal gas tragedy, a number of interlocutory applications were filed by both the parties. The Court has decided on most of the interlocutory applications. Attorneys for Union of India as well as Union Carbide had been taking follow-up action on the direction given by the District Judge, Bhopal in regard to settlement of the case. But they have reported to the Court that no settlement could be arrived at so far. An application has also been filed before the District Judge, Bhopal for deciding in the first instance the issue of liability as a preliminary issue.

The Central Bureau of Investigation has completed its enquiry on the criminal case registered in this connection and filed a charge sheet and prosecuted officers of Union Carbide Corporation and Union Carbide India Ltd. for the offences of culpable homicide, causing hurt to human beings and killing animals.

The Government of Madhya Pradesh has been taking all possible steps to provide relief and rehabilitation to the victims. Government of Madhya Pradesh has already set up medical infrastructure like the 125 bedded Jawaharlal Nehru Hospital, a separate ward in Hamidia Hospital, Bhopal, additional medical facilities in the gas affected areas for providing medical relief to gas victims. There is also a proposal to construct a 520 bedded Kamala Nehru Hosp
modern laboratories and equipment in the ca
Hamidia Hospital. Many programmes for econo
bilitation of gas victims, like disbursement of loa
needy gas affected families under the Special Tr
Employment Programme for Urban Poor (STEP)
grammes for assistance to gas affected women
dren under ICDS projects, etc. are being imple
However, the Government of Madhya Pradesh is
ing a longterm action plan for medical, economi
and environmental rehabilitation.

PETROCHEMICALS

Today, the petrochemical products have perv
walks of life. You see petrochemical products in
of plastics in our daily chores such as tooth brush, s
plastic utensils or in the form of polyester fabric
colour to life or in the form of detergents, soaps,
petrochemical products with their superior prope
fast substituting traditional raw materials like woo
metal, etc. and they have opened up immense pos
of application both for domestic as well as indust
ducts. For developing countries like ours, petroch
have a great economic relevance and petrochemical
try is poised for rapid growth in future years.

Government has been promoting the growth of th
try in recognition of the impact it has made and c
on the national economy. The trend of growth in
sumption of plastics, synthetic rubbers and synthet
indicates the need for setting up of such industries
in the coming years not only the dependence on
is reduced/eliminated, but the country also has so
plus for export. The increased domestic availability
tha and natural gas has made it possible to plan
establishment of higher manufacturing capacities
required petrochemicals.

To cover the gap between the projected dem
already approved capacity in respect of some of
rochemical products, the following projects have be
up for the implementation in the Central Public

1. IPCL is implementing the following major ex
programmes:
    (a) Expansion of capacity for the manufacture of
    from 40,500 MT to 96,500 MT at an estimat
    of Rs. 70.70 crores. Expected date of compl
    March, 1988.
    (b) Expansion of capacity for the manufacture of

from 12,000 to 24,000 tonnes/annum at an esti- d cost of Rs. 99.46 crores. The project is expected completed in 1987-88.

ansion of capacity for the manufacture of linear l benzene from 30,000 MTA to 43,500 MTA at stimated cost of Rs. 18.38 crores. Expected date completion is July, 1988.

L has implemented the expansion of capacity for manufacture of polypropylene from 30,000 MT 55,000 MT at a cost of Rs. 68.78 crores. The unit been mechanically completed in July, 1987. is engaged in setting up of a PSF plant of 30,000 /annum capacity which is expected to be completed

ils Co-operative Limited is to set up a 6,000 ton- nnum nylon-6 plant. Expected date of completion rch, 1990.

zers and Chemicals Travancore Limited is erect- plant for the manufacture of 50,000 tonnes/annum rolactum. Expected date of completion is July,

n Refineries Limited is in the process of imple- ing a benzene extraction project which will have a ty of 87,000 tonnes/annum. Expected date of anical completion is November, 1988.

ylene separation from FCC C_3/C_4 stream at Madras ery Limited, Madras; propylene to the extent of 0 MT is expected to be available from this facility. estimated capital cost is about Rs. 14 crores. cted date of mechanical completion is June, 1988.

Maharashtra Gas Cracker Complex which is being emented by IPCL will produce the following:

	80,000 tonnes/annum
E	80,000 tonnes/annum
E	55,000 tonnes/annum
ropylene	60,000 tonnes/annum
ene Glycol	50,000 tonnes/annum
ene Oxide	5,000 tonnes/annum
lene	2,500 tonnes/annum

expected date of completion is August, 1989.

ollowing projects are going to be set up in Joint/As- Sector:

IA PETROCHEMICALS COMPLEX

project will be implemented by M/s. Haldia Petro- cals Limited in joint sector with partnership of West l Industrial Development Corporation (WBIDC) to manufacture 1,00,000 tonnes/annum of ethylene and other products. The estimated capital cost of the complex is Rs. 1,400 crores.

SALEEMPUR AROMATICS COMPLEX

Possibility of setting up an aromatic complex at Saleempur is being explored for producing benzene, o-xylene and p-xylene and PTA based on naphtha from the nearby Mathura Refinery.

In addition, capacities for the manufacture of caprolactum, PTA, LAB, synthetic fibres, plastics and synthetic rubbers have been approved in favour of state/joint/private sector parties. These units are at various stages of implementation. The establishment of the above capacities will require to be supported by matching capacities for the production of basic feedstocks and intermediates. This will require the setting up of additional aromatics and olefinic complexes. Exercise is already in hand to identify the availability of raw materials (naphtha, natural gas or NGL) for the purpose and suitable location for setting up such complexes.

Apart from setting up of new capacities, certain policy initiatives have been taken to promote growth of the petrochemicals industry. The Government has permitted broadbanding in synthetic fibres and filament yarn industries to enable the existing units to use the common spinning facilities for manufacture of polyester filament, nylon yarn and polypropylene yarn. Economies of scale have been enforced with the laying down of minimum economic sizes for the petrochemical units. The Licencing Policy for synthetic fibres has been liberalised by allowing the existing units with sub-optimal capacities to expand to the minimum economic sizes. Recently in October 1987, Government has permitted merchant sale of polyester chips. Earlier, the synthetic fibre and filament manufacturers were required to have captive poly-condensation facilities. Now these units have been allowed to set up the capacities on bought-out chips. A long-term integrated growth oriented plan for the petrochemicals industry aimed at identifying the availability of feedstock and establishing linkages between availablity of basic intermediates and downstream units has been formulated through a high level committee set up for this purpose. A National Development Council for the petrochemicals industry has also recently been set up.

With the increasing availability of plastic raw material and consequent increase in the trained manpower requirement, the activities of the Central Institute of Plastics Engineering and Technology (CIPET), a society registered der Societies Act, have expanded particularly during the th Five Year Plan. Five additional regional extension centres by CIPET, apart from those at Madras and Secunderabad, have been sanctioned to cover all the regions in the country at Lucknow (UP), Hyderabad (AP), Bhubaneshwar (Orissa), Bhopal (MP) and Imphal (Manipur). Besides training, testing and consultancy activities etc. these required centres will concentrate on said areas centre wise, and plastic machinery, teletronics engineering, plastic and their applications development, plastics in housing and packaging applications, plastic culture and water management.

The National Committee on the Use of Plastics in Agriculture (NCPA) has been reconstituted with its broadened scope for recommending measures for development and promotion of use of plastics in the agriculture sector. Pursuant to the recommendations of the earlier NCPA, 23 Plasticulture Development Centres (PDC) are being set up in the country during the 7th Five Year Plan against the target of 22 PDCs. 3 PDCs were set up in 1985-86 and 8 in 1986-87. 9 PDCs are being set up in 1987-88 and 3 more PDCs are planned for 1988-89.

DRUGS AND PHARMACEUTICALS UNDERTAKINGS IN THE PUBLIC SECTOR

INDIAN DRUGS & PHARMACEUTICALS LTD.

Indian Drugs & Pharmaceuticals Limited (IDPL) was incorporated under the Companies Act, 1956, on 5th April 1961. It has five plants -- at Rishikesh for manufacture of antibiotics, at Hyderabad for manufacture of synthetic drugs, at Madras for surgical instruments and formulations, at Gurgaon for formulations and at Muzaffapur for drugs and chemicals intermediates. It has also three subsidiaries set up in collaboration with the State Industrial Development Corporations of Uttar Pradesh, Rajasthan and Orissa. It has recently disinvested its share holding in Punjab Maize Products Ltd., Sangrur in favour of PSIDC, Chandigarh.

Production/Sales Performance:

The company produced drugs, formulations, surgical instruments and fine chemicals amounting to Rs. 85.83 crores during 1986-87 as against Rs. 119.01 crores during 1985-86. Their sales amounted to Rs. 91.34 crores during 1986-87 as compared to Rs. 117.46 crores during 1985-86.

The value of production of IDPL during the period April/November 1987 has been Rs. 95.37 crores as against Rs. 50.70 crores during the corresponding period of the previous year. Their sales during April/November 19 amounted to Rs. 82.08 crores as compared to Rs. 56 crores during April/November 1986.

Plant-wise Performance

A brief account of working of IDPL's various pla during 1987-88 (April/November 1987) is given below

IDPL, Virbhadra (Rishikesh)

This plant produced bulk antibiotics worth Rs. 36. crores during April/November 1987 as compared to R 18.39 crores during the corresponding period of the pr vious year.

IDPL, Hyderabad

This plant manufactured bulk drugs and formulatio worth Rs. 43.91 crores during April/November 1987 compared to Rs. 22.32 crores during April/November 19

IDPL, Gurgaon

The value of production of the plant during April/N vember 1987 was Rs. 7.12 crores as against Rs. 4.40 cro during the same period of the previous year.

IDPL, Muzaffarpur

This plant manufactured drugs and chemicals amou ing to Rs. 2.15 crores during April/November 1987 as co pared to Rs. 1.95 crores during the corresponding peri of the previous year.

IDPL, Madras

The value of surgical instruments and formulations pr duced in this plant during April/November 1987 was R 5.53 crores as against Rs. 3.64 crores during the Apr November 1986.

Joint Sector Projects

Uttar Pradesh Drugs & Pharmaceuticals Ltd., Luckno

This company was set up in 1978 in collaboration w Pradeshia Industrial and Investment Corporation of Ut Pradesh (PIICUP). This plant was commissioned in Oc ber 1979. IDPL has 51% share holding of this compa It has been continuously making profit since 1980-81 a has declared a dividend of 10% for the year 1986-87.

Value of the production of this company during 1986- was Rs. 7.28 crores as compared to Rs. 12.70 crores dur

5. Its sales during 1986 were worth Rs. 10.14 crores pared to Rs. 12.10 crores during the previous year.

Drugs & Pharmaceuticals Ltd., Bhubaneshwar

company was incorporated on 1st May 1979 in col- tion with Industrial Promotion and Investment Cor- on of Orissa Ltd. (IPICOL) and was fully issioned for production in September 1983. IDPL 51% share in the equity capital of this company. Value duction of this company during 1986-87 was Rs. 0.90 s as compared to Rs. 1.53 crores during 1985-86. Their during 1986-87 ammounted to Rs. 1.04 crores as nst Rs. 1.61 crores during 1985-86.

jab Maize Products Ltd., Sangrur

Government granted its approval in May 1977 for this ject with IDPL's shareholding of 51% of the total equity his company for the manufacture of dextrose, starch glu- e, liquid glucose, etc. The production of this unit was continued in June 1983. With the approval of Govern- nt, IDPL has disinvested its equity share in favour of IDC as per an agreement entered into with them.

NDUSTAN ANTIBIOTICS LIMITED

Hindustan Antibiotics Limited (HAL) was incorporated 30th March 1954. It manufactures antibiotics like pen- llin, streptomycin, ampicillin, gentamycin, etc.

roduction/Sales Performance

Its production during 1986-87 amounted to Rs. 53.94 rores as compared to Rs. 39.80 crores during the previous ear. Sales turnover of the company during 1986-87 was s. 52.69 crores as against Rs. 42.74 crores during 1985-86.

Value of its production and sales during 1987-88 (April/ ovember 1987) was Rs. 43.75 crores and Rs. 35.84 crores compared to Rs. 31.11 crores and Rs. 26.83 crores respec- ively during the same period of 1986-87.

ntroduction/Development of New Formulations

During 1987-88, the following formulations have been ntroduced:

1. Nifedipine capsules
2. Cefazoline injection
3. Ranitidine tablets
4. Cimetidine tablets
5. Trimethoprim and sulphadisine bolus (veterinary).

Subsidiaries

HAL has two subsidiaries set up in collaboration with respective State Governments/Financial Institutions. Their performance during January/November 1987 was as under:

(Rs. in lakhs)

	Prodn.	Sales
Maharashtra Antibiotics & Pharmaceuticals Ltd., Nagpur	351.19	400.85
Karnataka Antibiotics & Pharmaceuticals Ltd., Bangalore	794.28	786.05

BENGAL CHEMICALS & PHARMACEUTICALS LIMITED

Bengal Chemicals & Pharmaceuticals Limited (BCPL) was incorporated on 27th March, 1981 to take over the nationalised undertakings of Bengal Chemicals and Pharmaceuticals Works Limited.

The comany has four production units each at Maniktala and Panihati in West Bengal and at Kanpur in Uttar Pradesh and in Bombay in Maharashtra. It is making a wide range of chemicals, drugs and pharmaceuticals, cosmetics and home products. Value of its production and sales during 1986-87 was Rs. 12.07 crores and Rs. 10.97 crores as compared to Rs. 10.84 crores and Rs. 9.82 crores respectively during 1985-86.

BENGAL IMMUNITY LIMITED

Bengal Immunity Limited (BIL) was incorporated on 1st October 1984 to take over the nationalised undertakings of Bengal Immunity Company Limited. The company has two manufacturing units located at Calcutta in West Bengal and at Dehradun in Uttar Pradesh. Its production and sales during 1986-87 amounted to Rs. 7.18 crores and Rs. 7.80 crores as compared to Rs. 7.84 crores and Rs. 11.25 crores during 1985-86. Value of its production and sales during 1987-88 (April/November 1987) was Rs. 2.50 crores and Rs. 2.88 crores as against Rs. 4.00 crores and Rs. 4.47 crores during the corresponding period of the last year.

SMITH STANISTREET PHARMACEUTICALS LIMITED

Smith Stanistreet Pharmaceutials Limited (SSPL), Calcutta was nationalised on 1st October 1977. The company makes formulations only

Production/Sales Performance

Production and sales of the company during 1986-87 were worth Rs. 9.43 crores and Rs. 8.59 crores as compared to Rs. 8.84 crores and Rs. 9.67 crores during 1985-86.

The value of production and sales during 1987-88 (April/November 1987) were Rs. 5.36 crores and Rs. 5.90 crores.

ENERGY CONSERVATION MEASURES

Indian Drugs & Pharmaceuticals Ltd.

The company has already implemented energy saving schemes at their Rishikesh unit resulting in saving of about Rs. 22 lakhs. Schemes proposed for implementation from 1987-88 onwards at their Rishikesh and Hyderabad plants are expected to yield savings in the expenditure of Rs. 10 lakhs and Rs. 18 lakhs respectively.

Hindustan Antibiotics Ltd.

The company's conservation schemes for improving efficiency of boiler operations and for decreasing steam consumption in various processes have already been implemented. As a result, its expenditure on utilities as a percentage of the cost of production has come down from 23% in 1982-83 to 15% in 1987-88.

Bengal Immunity Ltd.

The company has taken measures for conservation of energy so as to achieve better fuel efficiency through rectification of their steam lines and for better utilisation of electric power with the introduction of proper distribution systems.

Bengal Chemicals & Pharmaceuticals Limited

The company has entrusted work on energy conservation to M/s. Balmer Lawrie & Co. Ltd. mainly in respect of their sulphuric acid and alum production at their Panihati factory.

Smith Stanistreet Pharmaceuticals Limited

The company has replaced its 50 year old smoke tube coal fired boiler by a fuel efficient package type unit fired boiler. It has also planned installation of redesigned energy efficient steam lines with condensate return system so as to utilise the heat content of the condensate system to reduce fuel cost. Maximum attention is being paid to efficient use of electrical energy through installa capacitor bank to improve power factor, rep worn out wiring installations, installation temperature/tripping device for electricity to so avoid wastage of power and regular servic set.

CHEMICALS AND PESTICIDES UNDERTAKINGS IN THE PUBLI SECTOR

There are two Public Sector units in the chem These are Hindustan Organic Chemicals Limite turing basic chemicals and Hindustan Insectici manufacturing pesticides primarily for the Na Eradication Programme.

HINDUSTAN INSECTICIDES LIMITED

Hindustan Insecticides Limited which was in in March, 1954 has at present three units at D ngamandal (Kerala) and Rasayani (Maharashtra pany has also a subsidiary company namely "Th Pesticides Corporation" with headquarters at Hyd factory at Kovvur. The company is engaged in afacture of DDT, BHC, Malathion and Endos major pesticides used in the country.

They supply the major portion of their form National Malaria Eradication Programme. The capital of the company as on 31.3.1987 was Rs. and the paid up capital was raised to Rs. 25.68 cr Rs. 23.96 crores. The production performance of H last three years has been as follows:

Item	1985-86	1986-87
DDT (Tech.)	5217	8117
DDT (Form.)	9959	11137
BHC (Tech.)	2520	1535
BHC (Form.)	2022	2685
Malathion (Tech.)	1176	535
Malathion (Form.)	3289	1484
Endosulfan (Tech.)	190	62
Sub Total (Tech.)	9103	10249
Sub Total (Form.)	15270	15606
Total	24373	25855

ny incurred a profit (Net) of Rs. 40.00 lakh 87. Net sales amounted to Rs. 47.90 crores 87

N ORGANIC CHEMICALS LIMITED

Organic Chemical Chemicals Limited was d on 12th December, 1960 with authorised cap- 2 crores with the main objective of manufac- ical intermediates required for drugs, dyestuffs, micals and other vital chemicals. Due to further of the company the authorised capital was rom time to time and presently stands at Rs. 70

pany started its operations in 1970 at Rasayani, ad, Maharashtra. Today this complex comprises cal plants manufacturing 26 different chemical ates based on sophisticated technologies and the itment made is Rs. 80 crores. The company has p a phenol project at Cochin for manufacture of PA of phenol and 24,000 TPA of acetone at an cost of Rs. 83.50 crores, which has been com- in November, 1987. The company has floated y company M/s. Hindustan Fluorocarbons Lim- ting up a poly-tetra-fluoroethylene (PTFE) plant PA capacity in Medak District of Andhra Pradesh mated cost of Rs. 31.84 crores, jointly with APIDC e participation in equity capital. The PTFE plant commenced production in November, 1987.

mpany's performance for the last four years is he table below. The company has been paying div- Government of India consistently for the last 13 e company has got an ambitious expansion plan ncludes projects for Diphenyl Methane Di- te (MDI), PTFE applications, Cyclohexane/nol, rohydrine/Glycerine, Propylene Trimer/Tetramer, ehyde and Captive power plant at Cochin at a total ent of Rs. 130 crores.

PETROCHEMICAL UNDERTAKINGS IN THE PUBLIC SECTOR AND OTHER ORGANISATIONS

INDIAN PETROCHEMICALS CORPORATION LTD.

Indian Petrochemicals Corporation Limited, a Public Sector Undertaking of the Department of Chemicals and Petrochemicals has an intergrated petrochemicals complex near Vadodara producing various petrochemicals like polymers, chemicals, fibre and fibre intermediates. Details of the production during the year 1986-87 and anticipated production in 1987-88 are given below:

Plant/Major	Installed Capacity	Production in 1986-87 (in MT)	Production anticipated for 1987-88 (in MT)
Aromatics			
Oxylenes	40,500	34,831	34,000
DMT	30,000	28,132	28,000
Downstream Plants			
LDPE	80,000	79,041	77,440
PP	30,000	23,658	27,460
PBR	20,000	15,527	17,000
Ethylene Oxide /glycol	20,000	18,262	18,240
ACN	24,000	22,502	26,000
AF	12,000	12,118	12,000
LAB	30,000	30,297	30,000
PVC	55,000	41,379	50,490

Presently the company is engaged in implementation of the following major expansion projects:

a) IPCL has implemented the expansion of capacity for the manufacture of polypropylene from 30,000 MT to 55,000 MT at a cost of Rs. 68.78 crores. The unit has been mechanically completed in July 1987.

PERFORMANCE OF HINDUSTAN ORGANIC CHEMICALS LIMITED

	Unit	Installed capacity TPA	Production MTS	Sales Turnover Rs. in lakhs	Operating profit Rs. in lakhs	Net Profit before tax
	Rasayani	122,846	113,946	6,536	1,379	611
	Rasayani	131,514	114,728	7,047	1,500	648
	Rasayani	133,862	135,200	8,481	2,051	852
	Rasayani	135,286	134,852	8,920	2,050	900
ated)	Cochin		20,800*	3,993	930	85

ember 1987 to March 1988)

b) Gas Turbine Power Plant with a capacity of 28 x 2 MW at an anticipated cost of Rs. 72.50 crores is scheduled to be mechanically completed in March 1988.

c) Expansion of capacity for the manufacture of acrylic fibre from 12,000 to 24,000 tonnes/annum at an estimated cost of Rs. 99.50 crores. The project is expected to be completed by the end of 1987-88.

d) Expansion of capacity for the manufacture of linear alkyl benzene from 30,000 MTA to 43,500 MTA at an estimated cost of Rs. 18.36 crores. Expected date of completion is July 1988.

e) Expansion of the capacity for the manufacture of xylenes from 40,500 MT to 96,500 MT at an estimated cost of Rs. 70.70 crores. Expected date of completion is March 1989.

f) Maharashtra Gas Cracker Complex: Investment approval has been accorded to take up the MGCC at an estimated cost of Rs. 1,167 crores (including foreign exchange component of Rs. 289 crores) with an ethylene capacity of 3,00,000 tonnes/annum. The total fund requirement of the project is proposed to be met through World Bank loan, internal generation of IPCL and issue of debentures, etc. by IPCL. In this complex, important plastics namely LDPE, LLDPE, HDPE and polypropylene will be produced. In addition, ethylene oxide/glycol and acetylene black and wire and cable expansion will also be produced. Selection of technologies for the plants have been tied up. The project is scheduled to be mechanically completed in August 1989. Implementation of this project would save scarce foreign exchange to the tune of $250 million per annum which is otherwise required for the imports of these items. The capacities of various units planned under MGCC are of international size and this complex would make optimum utilisation of ethane/propane fraction of gas by making value added products.

The sales turnover of the corporation has gone up from Rs. 619 crores in 1985-86 to Rs. 699 crores in 1986-87 registering a growth of 13% over the previous year. The net profit before tax of the corporation has been Rs. 77.70 crores after providing Rs. 41 crores as depreciation. During the year 1986-87, the corporation has declared a dividend of 10% as in 1985-86 amounting to Rs. 18.60 crores.

PETROFILS COOPERATIVES LIMITED

The production of polyester filament yarn by this venture between the Government of India and the Co ative of yarn users established with an initial capacit 3,500 tonnes/annum (since expanded by 7,000 tonnes num) increased from 4,500 tonnes in 1980-81 to 8 tonnes in 1986-87. In 1987-88, the production is expe to increase further to 8,840 tonnes.

The sales turnover of the society has gone up from 61.65 crores in 1980-81 to Rs. 143.22 crores in 1986 The profit before tax during 1986-87 has been Rs. crores. PCL plans to set up a grass root plant for the m ufacture of 6,000 tonnes/annum nylon-6 filament yarn at Valia in Gujarat with a capital outlay of Rs. 73.35 cr The plant is expected to be ready by March 1990. PCL proposes to set up a spandex yarn plant of 300 MTA estimated cost of about Rs. 35 crores at Valia (Guj PCL also proposes to expand the existing plant cap of PFY from 7,000 MTA to 9,000 MTA. PCL has c missioned a second dyeing plant at an investment of 1.82 crores with a capacity of 500 MTA in October 1

CENTRAL INSTITUTE OF PLASTICS ENGINEERING & TOOLS

The Central Institute of Plastics Engineering & T (CIPET), Madras was set up in 1968 as a Society r tered under the Societies Act. Its main objectives are t ing in different areas of plastics engineering e.g. pla mould technology, plastics mould design, plastics pro sing technology, tool engineering, testing plastics ma als and evaluation of moulds, dies and products; desig and development of moulds and dies for plastics pro sing industry; providing facilities for establishing nat standards and quality control of plastics and finished ducts in association with Bureau of Indian Standards; providing consultancy and advisory services to the pla industry. With the increasing availability of plastics materials and consequent increased need for trained m power, the activities of CIPET have expanded particu during the 7th Five Year Plan. The following Exter Centres of CIPET have been sanctioned to cover al regions in the country.

Location of Extension Centre	Special emphasis of Extension Centre
Ahmedabad (Gujarat) (Already set-up)	Plastics machinery
Lucknow (UP)	Teletronics
Hyderabad (AP)	Engineering Plastics and their application developme
[illegible] (Orissa)	Plastics in housing and packaging applications
[illegible] (MP)	Plasticulture
[illegible]	Water Management

Ministry of Agriculture

Department of Fertilizers

Extracts from the Annual Report (1987-88)

ODUCTION

Government attaches great importance to the devel- nt of the Fertilizer Industry. The Department of Fer- s is responsible for this core area involving production ilizers for agriculture and to ensure, timely and in ade- quantity, the availability of this key input for the opment of agriculture.

th the re-organisation of the Ministry of Chemicals ertilizers, an independent Department of Fertilizers Ministry of Agriculture came into being on the 25th mber, 1985. Shri R. Prabhu, Minister of State held e of this Department throughout the year under report, Ministry of Agriculture, which was headed by Cab- Minister, Shri G. S. Dhillon till 14th February, 1988. Bhajan Lal took over as Minister for Agriculture there- Shri K.D. Vasudeva held charge of the Department cretary throughout the year under report.

lights

e highlights of the year are:

e production of Nitrogenous fertilizer during 1987-88 likely to be 54.30 lakh tonnes. This could be still higher it for equipment problems, water and power shortages ring the year.

roduction of P_2O_5 in 1987-88 is expected to be 16.60 kh tonnes, maintaining the production level of 1986-87 espite acute shortage of imported Phosphoric Acid.

he overall capacity utilisation of the Fertilizer Units uring the year 1987-88 is expected to be over 77%.

eeping in view the anticipated demand of 91 lakh tonnes f Nitrogenous Fertilizers and 30 lakh tonnes of P_2O_5 y the turn of the 7th plan, a big programme for setting up additional fertilizer capacity has been taken up to achieve an installed capacity of 95 lakh tonnes of Nitrogenous fertilizers and 29 lakh tonnes of P_2O_5 by 1989-90.

5. Government continued to make this heavily subsidised vital agricultural input available timely, adequately and at cheaper rates, to the ultimate beneficiary — the farmer. The subsidy under the Fertilizers Retention Price Scheme has increased from a level of Rs. 275 crores in 1981-82 to Rs. 2050 crores 1987-88. A budget provision of Rs. 2750 crores has been made for 1988-89.

6. Seventy per cent of the equipment required for a Fertilizer plant can at present be produced indigenously by the Engineering and manufacturing capacities built so far.

GROWTH OF THE FERTILIZER INDUSTRY

Three decades of planned development of fertilizer industry has considerably abridged the gap between the demand and supply of indigenously produced fertilizer and made India a front ranking fertilizer producing country and has also brought the country some degree of self-sufficiency in its requirements of fertilizer. With its agro-based economy, fertilizer — a vital agricultural input — aptly occupies the upper-most place in the developmental strategy of the country.

The production capacity has increased from 0.85 lakh tonnes of Nitrogenous and 0.63 lakh tonnes of P_2O_5 fertilizers in 1951-52 to 70.33 lakh tonnes of Nitrogenous and 22.63 lakh tonnes of P_2O_5 Fertilizers in 1987-88. A large expansion programme of 15 projects — eight Nitrogenous and seven Phosphatic fertiliser new/expansion projects —is in the pipeline which when get aground and completed will take the capacity upto 84.44 lakh tonnes of Nitrogenous and 25.90 lakh tonnes of P_2O_5 fertilizers by 1989-90. This is expected to meet considerably the anticipated increased demand of 91 lakh tonnes of Nitrogenous and 30 lakh tonnes of P_2O_5 fertilizers by then.

At present 113 units in all, both big and small are engaged in the production of a wide range of Nitrogenous and Complex/Phosphatic Fertilizers. A production of 54.30 lakh tonnes of Nitrogenous and 16.60 lakh tonnes of P_2O_5 fertilizers is likely to be achieved during 1987-88.

Capacity utilisation of the Fertilizer Industry is likely to be of the order of over 77 per cent in 1987-88. Braving the heavy odds in some ageing plants and power dips and cuts, equipment problems, shortage of inputs like imported Phos. acid, the industry anticipates to keep the tempo of production.

The public sector engineering and consultancy organisations in the field of fertilizers have acquired/developed the indigenous know-how and are capable of executing major Urea/Ammonia fertilizer plants based on transfer of technology agreement with foreign process licensors. Country is self-sufficient for 70 per cent of the equipment required for fertilizer plants. A variety of catalysts for fertilizer industry is being manufactured indigenously in the Public Sector.

PLAN PERFORMANCE: FERTILIZERS

Physical targets and Achievements: Seventh Five Year Plan:

The physical targets laid down during the Seventh Five Year Plan and achievements during the Plan period, are summarised in the Table below.

There has been, a substantial growth, both in absolute and percentage terms, in the capacity build-up as well as production of fertilizers during the 1st three years of the 7th 5 year Plan from a level of 55.70 lakh tonnes of Ni gen and 15.72 lakh tonnes of P_2O_5 in the year preced the 7th Plan (1984-85). The fertilizer capacity is likely go up to 70.33 lakh tonnes of Nitrogen and 22.63 lakh ton of P_2O_5 during the first 3 years of the 7th Plan period, p centage increase being 27.52 per cent in Nitrogen and 43. per cent in P_2O_5. Production of Fertilizers is likely to up from 39.17 lakh tonnes of Nitrogen and 12.64 lakh tonn of P_2O_5 in 1984-85 to 54.30 lakh tonnes of Nitrogen a 16.60 lakh tonnes of P_2O_5 in 1987-88 the percenta increase in production being 38.62 per cent in Nitrogen a 31.33 per cent in P_2O_5 during the first three years of t Seventh Five Year Plan. The percentage increase in pr duction is much higher than the percentage growth in capa ity during the first three years of the 7th Plan period. Th is the result of substantial improvement in capacity uti zation in the fertilizer industry.

Necessary action towards installation of the additior fertiliser capacity — both Nitrogenous and Phospha — envisaged during the Seventh Plan period, has alrea been taken. Of the six gas-based Nitrogenous fertilizer plar to be established during the Seventh Plan, three are like to go on stream by the middle of 1988. Work on the oth three Nitrogenous fertilizer plants is also at various stag of implementation and the Projects are likely to come by 1990-91. The six phosphatic fertilizer projects whi would be contributing the additional capacity of P_2 during the Seventh Plan period have also been either alrea taken up for implementation, or are in the process of beir taken on hand.

With the preproject activities already completed in respe of the new plants to be established during the Seventh Pla no slippage is anticipated in achievement of the Sevent Plan targets.

(Figures in lakh tonne

	Actual at the end of the 6th Five Year Plan	Target at the end of the 7th Five Year Plan (1985-86)	Actual at the end of the 2nd year of the 7th Plan (1986-87)	Estimates during the yea 1987-88
Fertilisers				
1. Capacity				
(i) Nitrogen	55.70	92.53	67.42	70.33
(ii) Phosphatic	15.72	26.91	20.23	22.63
2. Production				
(i) Nitrogen	39.17	65.60	54.10	54.30
(ii) Phosphatic	12.64	21.90	16.90	16.60

NCIAL PERFORMANCE:

th Five Year Plan:

total outlay for the Fertilizer Sector in the Seventh s as under:

Schemes	(Rs. in Crores)
LIC SECTOR	
ntinuing Schemes	1341.71
ew Schemes	34.75
evamping and Rehabilitation Schemes	521.78
enewals and Replacements	104.36
cience & Technology in the field of fertilizer	23.15
PERATIVE SECTOR	
dian Farmers Fertilizers Coop. Ltd.	502.29
rishak Bharati Coop. Ltd.	132.71
ERAL	
ational Project for strengthening of Fertilizer unloading handling and distribution facilities	48.00
Total	**2708.75**

he Plan expenditure in the first two years of the Sev- Five Year Plan ie. 1985-86 and 1986-87 was of the r of Rs. 637.5 crores and Rs. 844.57 crores respectively. outlay of Rs. 926 crores has been allocated for this or for 1987-88. Keeping in view the trend of expen- e and progress of projects the Revised outlay for 7-88 has been kept at Rs. 995.47 crores out of which mount of Rs. 435.80 crores is likely to be met from rnal and Extra Budgetary Resources of the Companies the balance amount of Rs. 559.67 crores has been pro- d for as budgetary support. An outlay of Rs. 671.00 es has been allocated for 1988-89 out of which Rs. 00 crores would be met out of Internal/Extra Budge- Resources and balance amount of Rs.335.00 crores ugh budgetary support.

TILIZERS

acity

here are, at present, 43 fertilizer units producing a wide e of Nitrogenous and complex/phosphatic fertilizers. ides, there are over 70 smaller units producing Single er Phosphate and six units producing Ammonium Sulphate as by-product from steel plants. During the year 1987-88, production has started in one new Nitrogenous fertiliser plant at Namrup-III (Hindustan Fertilizer Corporation Ltd.) in the public sector. Another nitrogenous fertilizer plant at Vijaipur Guna (National Fertilizers Limited) in public sector is likely to go into production during 1987-88. Fertilizer capacity as on 1st October, 1987 has gone upto 70.33 lakh tonnes of Nitrogen and 22.63 lakh tonnes of P_2O_5 as against 68.38 lakh tonnes of Nitrogen and 20.72 lakh tonnes of P_2O_5 at the end of 1986-87. Two new DAP plants at Sikka (Gujarat State Fertilizer Company) (GSFC) and Kakinada (Godavari Fertilizers and Chemicals Ltd.) (GFCL) are expected to go into production during the year 1987-88. At the end of the year 1987-88, fertilizer capacity is expected to go upto 74.8 lakh tonnes of Nitrogen and 25.14 lakhs tonnes of P_2O_5.

13 fertilizer projects, including new and expansion schemes are, at present, under implementation. These include 8 Nitrogenous fertilizer and 5 Phosphatic fertilizer plants. Six of the eight Nitrogenous fertilizer plants are being established in Northern and Central India, one at Vijaipur (Madhya Pradesh), one at Sawai Madhopur (Rajasthan) and one each at Aonla, Jagdishpur, Babrala and Shahjahanpur in Uttar Pradesh; all these plants are based on the gas available off the West Coast. Nagarjuna Fertilizers (Kakinada) in Andhra Pradesh and Caprolactam/Ammonium Sulphate project of Udyogmandal in Kerala are the other two Nitrogenous fertilizer plants being set up. The 5 Phosphatic fertilizer plants under implementation include Paradeep (Phase-II); Sikka (Gujarat), Godavari Fertilizers (Kakinada, Andhra Pradesh), Tuticorin DAP retrofitting project (Tamil Nadu) and Bharuch diversification project (Gujarat).

Seventh Plan Targets

The Seventh Plan envisages a capacity build-up of 92.53 lakhs tonnes of Nitrogen and 26.91 lakh tonnes of P_2O_5 by the year 1989-90. The plan also takes cognisance of the fact that production from this capacity would not be adequate to meet the demand of fertilizers by the year 1989-90 and beyond. Hence, imports will continue to be necessary.

Demand and Development of Additional Fertilizer Capacity

The demand for Nitrogenous and Phosphatic fertilizers is projected at 91 lakh tonnes of Nitrogen and 30 lakh tonnes of P_2O_5 at the end of Seventh Plan (1989-90) as against the consumption of 54.87 lakh tonnes of Nitrogen and 18.86 lakh tonnes of P_2O_5 at the end of Sixth Plan (1984-85). Keeping this increased demand in view, installation of substantial additional fertilizer capacity, as aforesaid, has already been taken in hand. With the installation of all the new fertilizer projects now under implementation, the fertilizer capacity is expected to go upto about 84.44 lakh tonnes of Nitrogen and 25.90 lakh tonnes of P_2O_5. Production from this capacity would, however, still fall short of the expected demand of fertilisers at the end of Seventh Plan. Imports of Nitrogenous and Phosphatic fertilizers, would, therefore, continue to be necessary so as to meet the full demand and ensure adequate availability.

The fertilizer demand would continue to rise beyond the Seventh Plan period also. The gap between demand and indigenous production would, therefore, rise still higher. In order to contain the gap at a reasonable level, additional fertilizer production capacity will have to be set up during the Eighth Plan period and prelimianry work in that direction commenced in the Seventh Plan period itself. A study Group to suggest the number, size, location and feedstock of new nitrogenous fertilizer plants was set up. The Group recommended that depending upon the fertilizer consumption trends and demand — supply scenario, it would be necessary to plan for establishment of 4-5 new plants of 1350 tonnes per day ammonia with matching urea capacity. The recommendations of the Study Group are being examined and a decision would be taken shortly.

Production

The production of Nitrogenous fertilizers during the year 1986-87 was 54.10 lakh tonnes as against the target of 51.75 lakh tonnes. Thus, the production exceeded the target.

For the year 1987-88, the annual production target was set at a much higher level of 56.00 lakh tonnes of Nitrogen. The production during the first eight months of the year (April-November, 1987) was 33.77 lakh tonnes of Nitrogen; which was less than the target for the period by 1.57 lakh tonnes. However, it registered an increase of 1.4 per cent over the production level reached during the corresponding period of last year. It is expected that the production of Nitrogen during the year 1987-88 would be 54.30 lakh tonnes. The production would have been higher but for equipment problems, power cuts and water shortage and less off take on account of drought in certain parts of the country.

The production of Phosphatic fertilizers during the year 1986-87 was 16.60 lakh tonnes of P_2O_5 as against the annual target of 17.75 lakhs tonnes. For the year 1987-88 the annual target was set at 21.00 lakh tonnes of P_2O_5. During the first eight months of the year (April-November, 1987), the production of phosphate was 9.88 lakh to as against the target of 13.25 lakh tonnes. It fell sho the pro-rata target by 25.4 per cent. Annual produtio 1987-88 is expected to be 16.60 lakh tonnes of P_2 against the target of 21.00 lakh tonnes due to shortag imported phos acid, equipment and power problems acute shortage of water in Southern States.

The units which suffered significant losses in produc during the year and the major reasons, therefore are as lows: —

FACT—Cochin-I Unit : Power cut and equipn problems.
FACT—Cochin-II Unit : Power cut and shortag Phos acid.
Madras Fertilizers Ltd : Shortage of raw water.
Paradeep Phosphates Ltd. : Shortage of imported acid, Ltd. marketing constraints and storage spa
Trombay V unit of RCF : Equipment and power blems.
Ramagundam unit of FCI : Shut-down from 11.4.8 26.8.1987 due to power restrictions and equipn problems.
Kandla unit of IFFCO : Shortage of imported acid.
Tuticorin unit of SPIC : Shortage of phos acid.
Kanpur unit of IEL : Power cut, maintenance jobs catalyst change.
Mangalore unit of MCF : Labour unrest, equipn and power problems, shortage of imported phos a
Sikka unit of GSFC : Delay in commissioning.
Haldia unit of HLL : Shortage of imported phos a
SSP units : Less offtake.

Capacity utilisation

Major improvement in capacity utilisation of the f lizer industry had occurred in 1986-87, when it touchec over-all level of 79.3 per cent for the Nitrogenous and Ph phatic fertilizer plants put together. However, this enc raging trend has been affected due to problems relatin equipment, power and shortage of water and imported p acid and the capacity utilisation of fertilizer industry du 1987-88 is expected to be around 77.0 per cent.

Capacity utilisation of the fertilizer industry is expe to improve further as more new generation modern pl based on proven technology and equipment go on str in the next few years.

The problem of low performance is confined, essenti old and sick units most of which are owned by the zer Corporation of India and Hindustan Fertilizer Cor- on. Besides problems of obsolescence and defective n/equipments, these plants are also faced with the prob- f unstable power supply. The power problem faced se plants is being tackled through installation of cap- ower facilities. A 30 MW gas turbine has already been lled at Talcher and captive power units of varying sizes nder installation at Barauni and Namrup. A captive er plant at Durgapur fertilizer unit has been commis- ed. Revamping/modernisation schemes are being con- red to mitigate the difficulties faced by these units on unt of frequent mechanical breakdowns and help rove their operations to the extent feasible.

A caprolactam-ammonium sulphate plant is being set up Udyogmandal by Fertilizers & Chemicals Travancore l. (FACT). As a measure of diversification this scheme uld help the Udyogmandal unit to improve its operational d financial viability. Besides, additional captive power pacity is proposed to be added to the Cochin unit of ACT.

Captive power plants of 30 MW each are also being stalled in Bhatinda and Panipat units which, though oth- wise sound, have not been able to reach their optimum oduction potential due to the recurring and frequent pro- ems of unstable power supply. In the new Nitrogenous rtilizer plants, captive power units are being built-in as art of the total project from the very beginning.

ricing of Fertilizers

It countinues to be the endeavour of the Government to rovide fertilizer to the farmers at a reasonable price in order o boost the fertilizer use and thereby the agricultural production. Government had reduced the prices of fertilizers by 7.5% w.e.f. 29th June, 1983. Fertilizers continued to be sold at the same reduced rate till 30th January, 1986. Effective from 31st January 1986, however, the selling prices of fertilizers were increased and restored to the levels prevailing before 29th June, 1983 with a view to containing the mounting increase in fertilizer subsidy.

The retention price scheme introduced for Nitrogenous fertilizers w.e.f. 1st November, 1977 and for Phosphatic fertilizers w.e.f. 1st February, 1979 continues to be in force. Under this scheme the manufacturers are enabled to earn a post-tax return of 12 per cent on the net-worth provided they operate at stipulated levels of efficiency.

The scheme of fertilizer freight subsidy introduced w.e.f. 1st November, 1977 also continues to be in force. Unde this scheme, manufacturers have been encouraged to mov fertilizers upto the block headquarters in order to ensur availability of fertilizers in the interior areas, in adequat quantity and in time.

Prior to 1982, four fertilizer products were outside th purview of statutory price control — Single Super Phosphate, Ammonium Sulphate, Calcium Ammonium Nitrate and Ammonium Chloride. During the last five years, however, statutory price control alongwith the retention price scheme have been extended to these fertilizers also — Single Super Phosphate w.e.f. 23.5.82, Ammonium Sulphate and Calcium Ammonium Nitrate w.e.f. 21-8-1984 and Ammonium Chloride w.e.f. 19-4-1985.

Feedstock Policy for Fertilizers

The present feedstock Policy for fertilizers envisages development of additional fertilizers capacity based mainly on gas. While gas has to be accorded the first preference, consideration would be given to setting up more coal-based plants after production of the two coal-based plants at Talcher and Ramagundam has stabilized and it has been established that the coal-gasification technology is viable for large scale fertilizer production. Naphtha as a feedstock for fertilizers is considered in case of long-term disposal problem at inland location or where an existing plant at inland location can be expanded at relatively lower capital cost and completed in shorter time.

Indigenous Technology and Development of know-how

Considerable progress has been made in the acquisition/-development of indigenous know-how in the field of chemical and fertilizer industries by the public sector consultancy organisations, namely Projects and Development India Limited (PDIL), FACT Engineering and Design Organisation (FEDO) and Engineers India Ltd. (EIL). PDIL and FEDO are capable of executing major fertilizer plants based on transfer of technology agreements entered into with foreign process licensors for Ammonia and licence agreements for Urea. The Association of Indian Design and Engineering Consultancy Organisations is being progressively increased so that, in due course of time, they are in a position to provide total consultancy for a Nitrogenous fertilizer project. In recognition of the capabilities acquired by PDIL, the promoters of the gas-based fertilizer projects at Sawai Madhopur and Babrala have been asked to involve PDIL in the establishment of their plants as co-contractors with the foreign consultants. Alongwith engineering capability, the country has also developed a wide and diversified manufacturing capability for equipments. Today, about 70 per cent of the equipments required for a fertilizer plant can be manufactured in the country.

Mention also needs to be made of the achievements of PDIL in the field of catalysts. A number of catalysts required for the manufacture of fertilizer are now produced by them on the basis of their own technology.

Establishment of gas-based fertilizer plants during the Seventh Plan Period

Of the 10 Nitrogenous fertilizer plants based on the Bombay High/Bassein gas, two each at Thal and Hazira are already in production. Of the remaining six, three are at advanced stages of construction, at Vijaipur (Madhya Pradesh), Aonla (Uttar Pradesh) and Jagdishpur (Uttar Pradesh) and the ones at Sawai Madhopur (Rajasthan), Babrala (Uttar Pradesh) and Shahajabanpur (Uttar Pradesh) are at various stages of implementation. The projects at Vijaypur, Aonla and Jagdishpur are progressing as per schedule; they are expected to come up by mid-1988. There is, however, some delay in the implementation of the remaining three projects at Sawai Madhopur, Babrala and Shahajahanpur. At Sawai Madhopur, the Government has recently approved the process licence and technical service agreement with foreign collaborations subject to certain modifications. The zero date for the project is, therefore expected to commence as soon as agreements are sent to government for placing on record and the promoters obtain environmental clearance. The other two projects at Babrala and Shahjahanpur are at preliminary stages of implementation. It is anticipated that the Sawai Madhopur project will be completed by end of 1990 while Babrala and Shahjahanpur in mid-1991.

Each of the six gas-based fertilizer plants under implementation would have an annual capacity of 334,000 tonnes of Nitrogen, with an Ammonia plant of 1350 tonnes per day and Urea plant of matching capacity.

Fertiliser Movement

During the year 1986-87, 14.5 million tonnes of Fertilizers (both imported and indigenous) were moved by rail. For 1987-88, the Department of Fertilizers has fixed a target of 15 million tonnes. The actual loading from April to August, 1987 was 5 million tonnes by rail as compared to 5.3 million tonnes during the same period of 1986-87. The shortfall is on account of reduced level of imports. The lead of movement of fertilizers by rail has come down from 1072 kilometres during 1986-87 to 1023 Kms during 1987-88 (upto August, 1987).

Import of Fertilizers

The gap between the indigenous production and dem for fertilizers is met through imports. During the y 1986-87, 22.82 lakh tonnes of fertilizer nutrients w imported as compared to 33.99 lakh tonnes in 1985- During 1987-88 (upto Dec., 1987) a total of 6.85 lakh ton of fertilizer nutrients (N = 1.07, P = Nil and K = 5.78 la tonnes) have been imported.

Establishment of gas-based fertilizer plants during 7t plan period

With the discovery of oil and gas at Bombay High Go ernment considered various options for the optimum u of this gas. Conversion of this gas into nitrogenous fer lizers emerged the best economic option. Plants located ne the area of consumption were found to be more optimal tha plants located near the West Coast. However, in order t make use of the gas as early as possible, four plants (tw each at Thal and Hazira) were planned on an immediat basis on the west coast. As the estimated reserves of th gas are sufficient to service ten 1350 TPD of Ammoni Plants over a period of 20 years, it was decided to put u more nitrogenous fertiliser plants based on this gas in th Northern States, where the deficit of fertilizer was expecte to become acute in the coming years, The Government se up two committees, one to suggest the likely sites and the other the pipelines alignment. A combined report was submitted by these two committees in December, 1981. On the basis of Optimisation Studies conducted with the help of a mathematical model, the committees recommended the locations for the new gas based fertilizer plants, one in M.P., one in Rajasthan and four in U.P. Details given in the Table on next page.

PUBLIC SECTOR AND COOPERATIVE SECTOR UNDERTAKINGS IN THE FERTILIZER SECTOR

FERTILIZER CORPORATION OF INDIA LTD. (FCI)

The Fertilizer Corporation of India Limited (FCI) which came into existence on 1st January, 1961 was reorganised with effect from 1st April, 1978. It has four operating units, one each at Sindri (Bihar), Gorakhpur (U.P.), Ramagundam (A.P.) and Talcher (Orissa) with a total capacity of 8.08 lakh tonnes of Nitrogen and 1.50 lakh tonnes of P_2O_5. Besides, it has an organisation engaged in the mining of gypsum in Rajasthan known as the Jodhpur Mining Organisation. The authorised share capital of the Company as on 31st March, 1987 was Rs. 800 crores and paid-up capital Rs. 573.89 crores.

PROPOSED LOCATION FOR GAS-BASED FERTILIZER PLANTS

ocation	Ownership	Expected date of Commercial production	PRODUCTION Ammonia TPD	PRODUCTION Urea TPD
Vijaipur, Guna, M.P.	M/s. NFL	April, 1988	1350	2200
Aonla, Bareilly, U.P.	M/s. IFFCO	May, 1988	1350	2200
Jagdishpur, Sultanpur, U.P.	M/s. IGFCC	September, 1988	1350	2200
Billopa Village, Sawai Madhopur, Rajasthan	M/s. AFL	1st Quarter, 1991 (expected)	1350	2250
Babrala, Badaun, U.P.	M/s. TFL	3rd Quarter, 1991 (expected)	1350	2250
Shahjahanpur Dist., U.P.	M/s. Apeejay Fertilizers Ltd.	3rd Quarter, 1991 (expected)	1350	2250

luction performance:

ie overall production of the company during the year ,-87 was 3.91 lakhs tonnes of Nitrogen as compared 70 lakh tonnes of Nitrogen during 1985-86 registering icrease of 45 per cent over the previous year. The pro- ion of Nitrogenous Fertilizer during 1987-88 is likely e 3.5 lakh tonnes.

lri Modernisation:

roduction during the year 1986-87 was 135.3 thousand ies of Nitrogen as against 82,358 tonnes of Nitrogen ing the year, 1985-86. This unit is expected to produce 5 lakh tonnes of Nitrogenous Fertilizers during 1987-88.

dri rationalisation

The plant continues to be shut down since October 1984 to poor quality of raw material and plant design defi- ncies. There is a proposal to close it down for good.

rakhpur:

Production during 1986-87 was 84,079 tonnes of Nitro- r as compared to 78,899 tonnes during 1985-86. To prove the performance of the plant, which is already 18 ars old, many short term measures were undertaken which clude replacement of leaky revex in air separation unit lining of urea reactors and procurement of new centri- ge and renovation of old prilling tower. This unit is likely produce 0.75 lakh tonnes of Nitrogen during 1987-88.

As a long term measure for improving the production and ofitability of the Unit, a scheme of renovation and upgra- ation of technology in the Urea Plant has been drawn up by the Company. The scheme is estimated to cost Rs. 66.65 crores. OECF of Japan has agreed to finance 2635 million Yen for implementation of this project. The project envisages replacement of two existing streams of urea with one stream of 600 tonnes per day adopting ACES technology of Toyo Engineering Corporation. It also envisages providing balancing equipment for Ammonia Plant. Implementation of the above scheme will result in higher capacity utilisation, energy conservation, less input costs and abatement of pollution problems.

Ramagundam:

The plant produced 113.2 thousand MT of Nitrogen during 1986-87 as against 55,264 MT of Nitrogen in the previous year. The production achieved during the year was the highest since commissioning of the plant. Production during 1987-88 is expected to be 0.50 lakh tonnes.

Talcher:

The plant produced 58,819 MT of Nitrogen during 1986-87 as against 52,958 MT during the previous year. The plant continued to suffer from infra-structural limitations of power and quality of coal. The production during 1987-88 is estimated to be of the order of 0.89 lakh tonnes.

Rehabilitation for coal based plant at Ramagundam and Talcher:

In order to improve the production performance of both Ramagundam and Talcher Plants, an End-to-End Survey was conducted by M/s. Krupp Koppers. They had suggested certain major revamp measures. The implementation of these measures would cost Rs. 157.56 crores in the case of Ramagundam and Rs. 253.54 crores in the case of

Talcher. Due to limitation of funds, it has been decided by Government to implement these measures in phases. To begin with phase-I Rehabilitation of Ramagundam plant is proposed to be taken up. This would enable the plant to attain 60 per cent of the rated capacity. Detailed proposal submitted in this regard is under consideration of the Government.

Operating Results:

The overall results of FCI for 1986-87 showed a loss of Rs. 105.91 crores as compared to a loss of Rs. 127.21 crores in the previous year. The loss for the year includes interest to the tune of Rs. 22.93 crores on non-plan loan amounting to Rs. 158.93 crores on which interest holiday expired on 31st March 1986. Besides, due to unprecedented glut situation in the fertilizer market, higher discount had to be given on sale of fertilizer. The incremental expenditure on marketing due to this factor alone caused an expenditure of Rs. 24.07 crores compared to a sum of Rs. 3.83 crores in the year 1985-86.

Industrial Relations:

Industrial relations remained satisfactory during the year.

NATIONAL FERTILIZERS LIMITED (NFL):

National Fertilizers Limited was incorporated on 23rd August, 1974 for setting up two fertilizer plants — one at Bhatinda (Punjab) and another at Panipat (Haryana). Consequent upon the reorganisation of Fertilizer Corporation of India Ltd. and National Fertilizers Limited w.e.f. 1st April, 1978, Nangal Unit (including Nangal Expansion) of FCI was taken over by NFL. Subsequently the Company has been assigned the responsibility to set up a gas based Fertilizer Plant at Vijaipur in Madhya Pradesh, on the route of HBJ pipeline.

As on 31st March, 1987, the Company had an authorised capital of Rs. 500 crores and paid-up capital of Rs. 425.58 crores. The total installed capacity of NFL as on 31st March, 1987 was 7,01,920 tonnes of nitrogen. Apart from fertilizers, the company also produces heavy water and methanol at its Nangal plant and sulphur as by-product in all its three plants.

Production performance:

Overall Production Performance: During 1986-87 the Company recorded a production of 5.51 lakh MT of Nitrogen with the overall capacity utilisation of 78.49 per cent against the production and capacity utilisation of 5.26 MT and 75 per cent respectively, during the previous y

Nangal Unit:

This Unit produced 1.91 lakh MT of Nitrogen attai the capacity utilisation of 82.33 per cent against 2.16 l MT of Nitrogen and capacity utilisation of 93.4 per c during the last year. The achievement was slightly lo due to revamping and repair of old CAN plant. The 50 T Methanol plant produced 14,521 MTs of Methanol aga 12,446 MT during the last year. The capacity utilisat during the year was also higher i.e. 88 per cent against 75 per cent last year. The production of heavy water was 6, kgs during the year as compared to 6,974 kgs during previous year. The production during 1987-88 is expec to be 1.95 lakh tonnes of Nitrogen.

Panipat Unit:

This Unit's production during the year 1986-87 was 1 lakh tonnes of N as against 1.42 lakh tonnes of N produ in 1985-86. The capacity utilisation went up from 60.3 cent to 80.71 per cent. The achievement could still be hig but for production loss for about 22 days due to power co straints. The production during 1987-88 is estimated to of the order of 2.20 lakh tonnes.

Bhatinda Unit:

This Unit achieved a production of 1.69 lakh MT Nitrog during 1986-87 as compared to 1.66 lakh MT during t previous year registering a capacity utilisation of 72 per ce The production during 1987-88 is expected to be of the or of 1.90 lakh MT.

Financial performance:

During the year 1986-87, the company earned a net pro of Rs. 16.51 crores as compared to Rs. 36.44 crores duri the previous year. The profit is lower mainly because revision in consumption norms in the case of Bhatinda ar Panipat plants, non-compensation for escalation in pric of inputs and utilities from 1st April, 1986. The compar has paid the token dividend of Rs. 4.10 crores at 1 per ce of the paid up capital. The company is expected to earn profit of Rs. 34.45 crores during 1987-88.

New Projects:

The progress of 1,350 TPD Ammonia and 2200 TPD Ure gas based plant at Vijaipur in the State of Madhya Prade on the route of HBJ pipeline, has been as per schedule an within the approved cost estimates. Commissioning activ in full-swing and the project is poised for com- production shortly.

rnment approved Captive Power Plants to be set- hatinda and Panipat Units at a cost of Rs. 138.64 The expenditure upto 31st March 1987 amounted 15.82 crore. The Captive Power Plants are antici- o be commissioned as per schedule.

ernment also approved replacement of the existing olysis Plant at Nangal with Naphtha Reformation Hydrogen Plant at an estimated cost of Rs. 28.65 Orders for main packaging have been placed and the is progressing well.

y, Ecology and Pollution Control

ngal and Bhatinda plants achieved highest ever accid- ee operation days during the year. About 1.5 lakh trees been planted in the townships, plant areas and sur- ding areas in all the three units of the company during ear.

istrial Relations

e industrial relations in the Company have been cor- The Shramvir Award for 1986-87 was awarded to an loyee of the Nangal Unit of the Company in recog- n of the outstanding contribution made by him towards er productivity and also showing exemplary dedication ork.

RTILIZERS & CHEMICALS TRAVANCORE LTD. CT)

he Fertilizers and Chemicals Travancore Limited, ia's first large-scale fertilizer Unit, was set up in 1943, he Private Sector in Udyogmandal, Cochin. In 1960, CT became a Public Sector Company and by the end 1962, the Government of India became the major share- der. From a modest beginning in 1943, FACT has anded and diversified into a multi-divisional Corpora- n The Udyogmandal Division has undergone four stages expansion between 1943 and 1972.

The Cochin Division was set up in two Phases at Ambal- edu near Cochin Refineries — Phase I for manufacture ammonia and urea was commissioned in 1973 and Phase consisting of sulphuric acid phosphoric acid and NPK nt in 1977. As a diversification plan for the Udyogman- Division, a huge project to manufacture ammonium Sul- ate/caprolactam is being set up which is expected to be mmissioned in 1988.

FACT Engineering and Design Organisation (FEDO) and the Fabrication Division, FACT Engineering Works (FEW) were started in the mid-sixties. The Paid-up Capital of the Company stood at Rs. 256.77 crores as on 31st March. 1987 against the authorised capital of Rs. 350 crores.

Financial Performance:

During the year 1986-87 the Company registered a record net profit of Rs. 41.45 crores as against Rs. 11.23 crores last year.

Performance of Divisions during 1986-87:

Udyogmandal Division:

The Udyogmandal Division is the oldest unit and has undergone many expansions/modifications during the last 40 years. In spite of its being an old and obsolete plant, it produced 52,494 MT of N_2 and 30,134 MT of P_2O_5 during 1986-87 against the production of 59,353 MT of N_2 and 31,784 MT of P_2O_5 respectively last year. The slight reduction in production during 1986-87 is mainly on account of the power cut imposed by the Kerala Government for about 1 and a half months during June/July 1986. This unit is likely to produce 53,000 MT of N_2 and 28,000 MT of P_2O_5 during 1987-88.

Cochin Division:

Cochin Division performance during the year has shown considerable improvement as compared to the previous year. The production of N_2 and P_2O_5 during 1986-87 was 1,85,662 MT and 90,053 MT as compared to 1,20,771 MT and 70,341 MT, respectively; registering an increase in percentage capacity utilisation of 54 and 28 respectively. The production during 1987-88 is likely to be of the order of 170,000 MT's of N_2 an 96,000 MTs of P_2O_5.

Marketing:

In spite of the severe odds faced by the Fertilizer Industry in general, the quantity of fertiliser sold by the Company was 9.10 lakhs MT during the year as against 8.96 lakhs MT last year. 47,000 MT of imported Urea was handled on behalf of Government of India.

The Indo-European Economic Community Fertilizer Education Project, for which the Company is an implementing agency in the four Southern States, was in its second year of operation. It is being implemented in 241 villages in Southern India.

FACT Engineering and Design Organisation (FEDO):

This Division completed the Phenol Project of Hindustan Organic Chemicals Limited, Zinc Roaster Modernisation-cum-Sulphuric Acid Plant for Comminco Binani Zinc Limited and the LPG Bottling facilities for Hindustan Petroleum Company, among others. It doubled its profits to Rs. 144 lakhs from the previous year's Rs. 83 lakhs.

The Division is conducting feasibility studies for an international joint sector Nitrogenous fertilizer Plant at Abu-Dhabi and for another Fertilizer Project in Algeria.

Fact Engineering Works (FEW):

The value of work done during the year by this Division was Rs. 395.68 lakhs, which is 8 per cent higher than Rs. 367.70 lakhs of last year. The Division has completed the erection of equipment and machinery and piping for Sulphuric Acid Plant for Comminco Binani Zinc Limited, underground piping work for the urea plant for National Fertilizers Limited, high pressure pumping and support system and erection of INSAT/HAT9 for Liquid Propulsion Unit for Indian Space Research Organisation.

This Division has acquired the assets of M/s. Giovanola Binny Limited at Palluruthy in Cochin which was under liquidation. It is expected that this acquisition will considerably boost the capabilities of FEW to take up many more sophisticated fabrication jobs in future.

Ammonium Sulphate Caprolactam Project (ASCL):

Orders have been placed for all the major items of equipment, machinery and instruments required for the Project. Against the target of 59.5 per cent, the actual progress achieved upto the end of the year (31-3-87) was 59.8 per cent. The actual expenditure incurred upto March 1987 was Rs. 9,281 lakhs against the target of Rs. 10,060 lakhs. The total commitment made on this Project upto the end of the year is Rs. 215.38 crores.

Research and Development:

The Research & Development wing has been entrusted with the task of monitoring the quality of Fertilizer produced and marketed as per the Fertilizer Control Order norms, by testing random samples from production and marketing units. Work was also in progress for the development of new fertiliser formulations like Slow Release Fertilisers, N:P:K:S Complex Fertilisers and Liquid Fertilisers.

Pollution Control:

The Company continued to give highest priority to p lution control and for ensuring a clean and green envir ment.

Personnel and Manpower Development and Industr Relations:

The Company employed 8,006 personnel as on 31-3-19 comprising of 1,717 Managers and 6,289 Non-Manage employees. The Company continued to give utmost imp tance to the training needs of both Managers and No Managerial employees. During the year 1986-87 the Co pany's Management Development Centre conducted 35 I house Training Programmes involving 835 participants. T industrial relations situation in the company was peace and cordial through out the year.

Developments of Scheduled Castes and Schedul Tribes:

The strength of Scheduled Castes and Scheduled Trib employees at the end of the year stood at 897 against 72 during the previous year.

Use of Hindi:

The Company continued to undertake many programm for implementation of the Official Language Act and Rule

Prime Minister's 20 Point Programme:

34500 trees were planted in the Company's Townshi during the year in an overall effort to make the environ ment cleaner and greener. The Company conducted 4 Family Planning Camps in its Hospitals. The Compan adopted 38 villages under the Rural Development Pro gramme.

RASHTRIYA CHEMICALS & FERTILIZERS LIMITE

Rashtriya Chemicals and Fertilizers Limited (RCF) wa incorporated on the 6th March, 1978 and it came into being as a result of the re-organisation of the erstwhile Fertiliser Corporation of India Ltd. At the time of its formation, the Company had one operating unit viz. Trombay (old plants) and two major projects under implementation viz. Trombay IV and TrombayV expansions, besides the West-South Marketing Zone and the Bombay Purchase and Liaison Office. The gas based fertilizer complex at Thal Vaishet in Maharashtra had also been allotted to the Company. As on the 31st March, 1987, the company had an authorised pital of Rs. 800 crores and a subscribed and paid tal of Rs. 551.69 crores.

ction Performance:

company has four operating units at Trombay and he Thal Fertilizer plant has started commercial pron w.e.f.1-6-1985. The annual installed capacity of the s on 1.4.1987 is 10 lakh tonnes of Nitrogen and 1.20 onnes of P_2O_5. Besides fertilizers, the company also ces a number of industrial products such as methargon gas, concentrated nitric acid and methylamines The production of fertilizers during 1986-87 was 00 tonnes of nitrogen and 101,400 tonnes of P_2O_5. anticipated production during 1987-88 is 869,000 es of nitrogen and 103,000 tonnes of P_2O_5.

he company continued the fertilizer promotion pro-mmes to increase the overall consumption of fertilizers cientific lines to increase food production and for the l-being of the farmers.

rating results:

he company expects a profit of Rs. 28.15 crores during 7-88 as against a profit of Rs. 20.11 crores during the r 1986-87. The company paid a dividend of Rs. 11.03 res at the rate of 2 per cent on its paid up share capital on 31st March, 1987.

NDUSTAN FERTILIZER CORPORATION LIMITED FC)

Consequent upon the re-organisation of the erstwhile Fer-zer Corporation of India (FCI) in April, 1978, HFC was corporated under the Indian Companies Act, 1956. The its at Namrup, Barauni, Durgapur and the Haldia Pro-ct, the Eastern Marketing Zone, Fertilizer Agricultural omotion and Agricultural Research Centre, Purchase and aison Office, Calcutta and Agronomy Wing of FP & ARD Sindri came under the control of HFC. As on the 31st arch, 1987 the company had an authorised capital of Rs. 0 crores and subscribed and paid up share capital of Rs. 60.72 crores.

roduction Performance:

The annual installed capacity of the units in operation 5.00 lakh tonnes of Nitrogen. The production of com-any during 1986-87 was 208,000 tonnes of Nitrogen. The nticipated production during 1987-88 is 2,97,000 tonnes f nitrogen.

Projects under implementation:

Namrup-III:

Namrup-III Fertilizer Project with a rated annual capacity of 152,000 tonnes of Nitrogen with natural gas as feedstock was approved by the Government in May, 1979 at an estimated cost of Rs. 168.43 crores with a foreign exchange component of Rs. 30.67 crores. The latest revised cost of the project has now been placed at Rs. 300.95 crores with a foreign exchange component of Rs. 56.59 crores.

The main reasons for the increase in the project cost are, change in the scope of project, escalation in price, inadequate provision, change in completion schedule and variation in taxes, etc.

The progress of the project in Namrup-III suffered mostly due to Assam situation. The civil works were delayed for a period of more than two years and some of the equipments supplied particularly, from the public sector undertakings, were also delayed for more than two years.

The project has started commercial production w.e.f. 1st October, 1987.

Haldia Project:

The Haldia Fertilizer Project was mechanically completed in November 1979. However, this project could not be commissioned, initially, due to non-availability of power from the West Bengal State Electricity Board. Government, therefore, had to approve a 20 MW gas turbine which was commissioned in January 1982. When the commissioning activities started, the project faced a number of equipment problems including defects in oxygen and nitrogen compressors. As there were frequent equipment problems during the commissioning of the project, Government decided in October, 1986 to stop the commissioning activities. However, consultants have been engaged to undertake an end-to-end survey of the project.

The company continued to organise activities in its marketing areas to educate the farmers in the correct choice and balanced use of fertilizers. The company also conducted a number of demonstration programmes in the farmers' fields and organised group discussions and conducted soil testings. The company is successfully implementing the Indo-British Fertilizer Education Project in 25 selected districts of Assam, Bihar, Madhya Pradesh, Orissa, Uttar Pradesh and West Bengal. The company has also successfully implemented the Indo-German Fertilizer Education Project in the State of West Bengal.

Operating results:

The company incurred a loss of Rs. 86.22 crores during 1986-87. The loss was mainly on account of lower capacity utilisation of the plants due to equipment and power problems. The company is expected to incur a loss of Rs. 90.50 crores during 1987-88.

MADRAS FERTILIZERS LIMITED (MFL)

Madras Fertilizers Limited was incorporated in December, 1966 initially as a joint venture between the Government of India and Amoco India Inc. of USA with equity share capital contribution of 51 per cent and 49 per cent respectively. The authorised share captial of the company as on 31st March, 1987 was Rs. 14 crores. The issued, subscribed and paid up capital remained at Rs. 13,64,68,000.

In accordance with the Participation Agreement between the Government of India (GOI), AMOCO India Inc. (AMOCO) and National Iranian Oil Company (NIOC), the NIOC acquired 50 per cent of the share holding of AMOCO in MFL on 22nd November, 1972. With this acquisition the percentage shareholding of Government and the other two parties upto July, 1987 was as under:

Government of India	..	51.0%
Amoco India Inc.	..	24.5%
National Iranian Oil Co.	..	24.5%

The share holding of AMOCO has been purchased by Government of India and NIOC in their respective proportions on 22nd July, 1985. With this purchase, the present position of share holding of MFL is as under:

Government of India	..	67.55%
N.I.O.C.	..	32.45%

Production performance

The annual installed capacity of the plants of MFL is 1,76,000 tonnes of Nitrogen and 1,12,000 tonnes of P_2O_5. The plant started production in November, 1971. The production of fertilizers during 1986-87 was 1,57,300 tonnes of Nitrogen and 103,000 tonnes of P_2O_5. The anticipated production during 1987-88 is 55,000 tonnes of Nitrogen and 61,000 tonnes of P_2O_5.

The production performance of the company during the year 1986-87 was very good, in spite of several constraints like frequent power trips, power failures, raw water scarcity and unexpected equipment problems.

The company actively associated itself in developing disseminating scientific agricultural practices with emp sis on dry land agriculture and on small and marginal gr of farm families.

Operating results:

The company's operations during the year 1987-88 expected to result in a substantial loss of Rs. 21.50 cro on account of low capacity utilisation due to acute pow and water shortage as against a net profit of Rs. 6.64 cror during the year 1986-87.

PYRITES, PHOSPHATES & CHEMICALS LIMITE

Pyrites, Phosphates and Chemicals Limited (PPCL) w set up in March 1960 initially, as a subsidiary of Nation Industrial Development Corporation Limited. It assume independent status in November, 1963, and has bee engaged in the mining of pyrites deposits at Amjhore Bihar, in exploratory-cum-production mining of pyrit deposits at Saladipura in Rajasthan and in the mining Rock Phosphate ore from the Mussoorie phosphorite depos its. Pyrites are used as a substitute for sulphur in the manufacture of sulphuric acid and also as soil amendmen material. The rock-phosphate so mined is powdered an supplied for direct application as a source of P_2O_5 in acidi soils.

The authorised capital of the company as on 31st March 1987 was Rs. 30.00 crores and the subscribed capital Rs 23.50 crores.

Projects of the Company:

Pyrites Mining Project — Amjhore, Bihar

The Amjhore Mining Project is situated in Distt. Rohtas, Bihar. These mines were developed to supply pyrites to the Sindri unit of Fertilizer Corporation of India, for the production of sulphuric acid. However, due to technological deficiencies, the sulphuric acid plant at Sindri could not operate successfully; therefore the mining project has been passing through a difficult phase and has practically come to a halt except for the production of fertilizer grade pyrites.

Consequent upon the stoppage of use of acid grade pyrites by its sole consumer i.e. Fertilizer Corporation of India since November, 1982, PPCL submitted a proposal to the Government for setting up of its own SSP plant of 625 TPD as well as Sulphuric Acid Plant of 240 TPD at Amjhore at a capital cost of Rs. 42.57 crores. The same has been approved by Government of India in the month of Octo-

36. The construction period of the Project is 30 with 31st March, 1987 as ZERO date. All the pre- ction activities viz. appointment of Process Licen- nsultants from abroad and India, land acquisition, ce from DGTD, import licence and placement of for all the major units of the project etc. are com- After breaking the ground in April, 1987 the site uction activities have started vigorously, so as to start ercial production of SSP by the middle of 1988 based ught out sulphuric acid till its own acid production pyrites which is expected to commence by middle of The seeding programme for SSP with trade name E GANGA KHAD' is planned from the current Rabi n.

uring the year 1986-87, PPCL was able market 26,129 es (20,138 tonnes in the previous year) of agricultural e pyrites. Sales remained low in the absence of firm rs from the Governments of Uttar Pradesh and Bihar.

loration-cum-production Mining Project-Saladipura:

he pyrites deposits at Saladipura in Rajasthan have rves of over 120 million tonnes (23-25 per cent Sul- r Grade). This low grade pyrites can be beneficiated to duce concentrates suitable for production of sulphuric l. The company has not only done detailed exploration also developed the deposits for production of pyrites h a view to making sulphuric acid for the production phosphatic fertilizers.

PPCL has submitted a Feasibility Report to produce 700 TPA of pyrites concentrates from Saladipura with estimated capital investment of Rs. 7.76 crores. PPCL s also proposed entering into an arrangement for supply the concentrates to an NRI party which has applied for ence to set up a sulphuric acid/SSP plant. This is being amined.

A good marble source has been established at Saladip- a in the same lease area in which PPCL's pyrites are cated. Exploration studies have already been done. PPCL s applied to the Government of Rajasthan for grant of ase for marble mining. The marble production is expected start by the end of this financial year. This will be a major eakthrough to start activities at Saladipura.

ussoorie Phosphorite Project, Dehradun:

Mussoorie Phosphorite deposits contain reserves of over 5 million tonnes (16 - 18% P_2O_5). Mining activities have een developed for production of 60,000 tonnes of ore per annum (20 - 40% P_2O_5). The rock phosphate so mined is powdered and marketed under the brand name of "Mussoorie Phos" for direct application as a source of P_2O_5 in acidic soils. The performance of this project during the year continued to be good. It has attained a production of 1,20,200 MT as against 1,02,225 MT in the previous year and its sale has also reached a new high of 1,16,659 MTs during the year as against 1,02,110 tonnes during the previous year. Plans are under-way for expansion of the present capacity to 1,40,000 tonnes.

Industrial Relations:

Industrial relations were generally cordial during the year.

PROJECTS AND DEVELOPMENT INDIA LIMITED (PDIL):

Projects & Development India Limited (PDIL) formerly known as Fertilizer (Planning & Development) India Limited was incorporated on 7th March, 1978 through the reorganisation of the erstwhile Fertilizer Corporation of India Limited. Its main activities are design, engineering technical procurement and supervision of construction/commissioning of fertilizer and other projects, research & development activities in the field of fertilizer industry, with a view to optimising the use of technical resource available with the company and production of wide range of catalysts. As on 31st March, 1987, the authorised share capital of the Company was Rs. 20.00 crores and paid-up capital of the company was Rs. 13.25 crores. The three main divisions of the Company are Engineering Consultancy, Research & Development and Catalysts, to carry-out these activities.

With a manpower resource of 3,478 which included 550 engineers and 230 scientists, PDIL has an excellent track record in the development of basic technical expertise, knowledge and self-suficiency in the fertilizer industry. Considering certain major achievements of PDIL, the year 1986-87 has been eventful, notwithstanding cash constraints resulting from the delays in the start of work on some major gas-based fertilizer projects.

Engineering Consultancy Division:

During the year, successful trial production of Ammonia and Urea was achieved in the 600 tpd Ammonia and 1167 tpd Urea gas-based Namrup-III project of Hindustan Fertilizer Corporation. This project was a turnkey assignment based on PDIL's own technologies for the production of Ammonia and Urea. Success in this project is a landmark e PDIL's efforts to achieve self-sufficiency in fertilizer echnology.

In the execution of gas-based projects, significant progress was made in the year by the Company.

Execution of 2,700 tpd Ammonia plant of Thal, Maha-ashtra has been completed and the plant has been accepted y owners, RCF. The 4,500 tpd Urea plant at Thal has also een accepted.

For Fertilizer projects based on HBJ gas, the tempo of progress has been maintained by adoption of strategies that ensure fast execution.

Engineering and Procurement activities for the 1,350 tpd Ammonia and 2250 tpd Urea plants for NFL at Vijaipur, M.P., have been completed. Intensive follow-up of critical supplies have been continued. Mobilisation of commissioning engineers have been started.

For 1,350 tpd Ammonia and 2,250 tpd urea fertilizer project of IFFCO at Aonla, U.P., the design engineering work has been completed. Expediting activities for critical supplies and construction activities have been maintained at the satisfactory level of progress.

For 1,350 tpd Ammonia and 2,250 tpd Urea fertilizer project of M/S. Indo-Gulf at Jagdishpur, U.P., PDIL's work for engineering has been almost completed. Follow-up activities and site activities have been maintained at levels ensuring expeditious completion.

With a view to diversify the activities and as a result of sustained efforts, several projects were bagged prior to 1986-87 in the keenly competitive environment prevailing in the engineering business in non-fertilizer areas, e.g. in the areas of Captive Power, Heavy Water, D.M. Plants, Oil and Gas Sector, etc. Satisfactory progress was maintained in 1986-87 in the execution of these projects.

For 30 MW Captive power plant for NFL at Bhatinda, [illegible] Heavy Water Project at Hazira and 16000 cu.m.p.h. [illegible] — and Hydrogen plant of NFL at Nangal, the engineering phases progressed satisfactorily during this year.

The 45 cu.m.p.h. DM plant for DVC at Durgapur has been commissioned and the 125x2 cu.m.p.h. DM plant for [illegible] at Vizag is fast nearing completion.

In the Oil and Gas Sector, PDIL has started consultancy work for ONGC for a Gas gathering station at [illegible] based on Project Report prepared by PDIL. A re mitted to GAIL this year on gas pricing of power plants.

Research and Development Division:

During 1986-87 services were extended to companies in the areas of cathodic protection, of gas/water pipelines, condition survey of m failure mode analysis, environmental impac NDT services were extended for preventive a maintenance to several plants in the fertilizer a

A sonic dedusting system has been develo cessfully tested for control of particulates from

General:

Diverse services were rendered this year i troubleshooting and other specialised areas. Be crystal characteristics were achieved by trial patented seeding technique in the Nitrophosp Haldia. Elemental sulphur was successfully pr Pyrites adopting PDIL process in a pilot unit Several reports and studies were completed. No them are the reports to Ministry of Agricultu tiser loading, handling and storage for distribut points and on small and large capacity Ammon plants. An evaluation report was submitted to of India on CO_2 removal process for futur Naphtha-based projects.

Catalyst Division:

Production of Catalyst during the year w against 589 tons during 1985-86. The sales of catalysts was Rs.724 lakhs against Rs. 650 year 1985-86.

Of particular significance is the reduction of P mary Gas Reformation catalyst at RCF's Tha record short period of 10 hours. Reduction is step with all such catalysts and shorter reducti ensure quicker start of production. Many fertilis in private and public sector have used PDIL's perature Shift Catalyst which has given very performance.

The Government of India had approved the Catalyst Modernisation Project at Sindri ture LT CO-Conversion, Primary Reforming Secondary Reformation and Methanation Cata was a slight set-back of construction by Civil ractors, the work is progressing satisfactorily. eing made to make up the delay which has n place in this project.

ation:

00 Computer in PDIL's engineering establish- has been increasingly put to use for var- ring and project management jobs. Linkage of e activities with project sites was established g micro computers at Vijaipur and Aonla.

4700 Mini Computer system at Sindri was made this year.

Results:

ng Results for the year ended 31st March, 1987 a loss of Rs. 39.18 lakhs against a profit of Rs. s in 1985-86.

Relations:

trial Relations of the Company have continued ful and peaceful during the year.

EP PHOSPHATES LTD. (PPL):

ep Phosphates Ltd. (PPL) was incorporated on and has its registered office at Bhubaneshwar. The has an authorised capital of Rs. 120 crores. The is engaged in setting up a Phosphatic Fertilizer Paradeep in the State of Orissa with a capital cost 6.77 crores with a foreign exchange component 84 crores. Government of India have entered into ation agreement with the Government of Neuru. will have 49 percent equity share in the author- tal of the Company.

talled capacities are as follows:—

monium Phosphate	–	7,20,000 TPA
ric Acid	–	6,60,000 TPA
ric Acid	–	2,25,000 TPA

AP Plant and the auxiliary facilities have been d and the plant commissioned on 26-2-1986 and ial production started on 1-8-86. There is however ay in the commissioning of Phase-II of the project sphoric Acid and Sulphuric Acid Plant) which is to be completed on 1-4-89. The Project cost is also likely to go up.

INDIAN FARMERS FERTILIZER COOPERATIVE LIMITED (IFFCO):

IFFCO was registered as a Company on November 3, 1967 to manufacture Chemical Fertilizers for supply to the Cooperative Sector, the biggest channel for fertilizer distribution. This was the pioneer fertilizer company set up in the Cooperative Sector. The company commissioned its two Fertilizer Plants at Kalol and Kandla in 1974-75. It expanded the capacity at Kandla in 1981 and in 1982 commissioned a new plant at Phulpur. The company is at present engaged in the implementation of another fertilizer plant at Aonla in U.P. The commercial production from this plant is expected by April 1988. As on 30th July, 1987 the company's share capital stood at Rs. 325.04 crores.

Production Performance:

During the year 1986-87 the company produced 5.39 lakh tonnes of Nitrogen and 3.42 lakh tonnes of P_2O_5 against a target of 4.79 lakh tonnes of Nitrogen and 3.45 lakh tonnes of P_2O_5 representing the capacity utilisation of 113 per cent in respect of Nitrogen and 122% in respect of P_2O_5. The company is expected to produce 5.00 lakh tonnes of Nitrogen and 3.00 lakh tonnes of P_2O_5 during 1987-88.

Financial Performance:

During the Cooperative Year 1985-86, IFFCO earned a net profit of Rs. 30.00 crores. The accounts for the year 1986-87 are under finalisation and the company is likely to show a profit of Rs. 10 crores. The company anticipates a profit of Rs. 24.64 crores during 1987-88.

KRISHAK BHARATI CO-OP. LTD. (KRIBHCO):

A multi unit Cooperative Society under the name of Krishak Bharati Cooperative Limited (KRIBHCO) was incorporated on 17th April, 1980 to implement the Hazira Fertilizer Complex. The authorised capital of the company is Rs. 500 crores and the paid up capital is Rs. 461.40 crores as on 30th June, 1987. The Hazira Fertilizer Project is located near Surat city. The plant has two Ammonia phases of 1350 MT/day each and two Urea phases of 2200 MT/day each. Each phase of Urea Plant consists of two streams of 1100 MT/day each. The annual installed capacity of Urea Plant is 14.52 lakh MT of product (6.68 lakh MT in terms of 'N'). The Steam Generation Plant consisting of 3 Nos. boiler provides steam for the processes and also for captive power generation. The capacity of captive power pl [illegible] Other facilities include [illegible] bulk storage building, workshop, laboratory and [illegible] service building etc. Railway siding is in operation with adequate capacity to despatch the finished product.

Operating Performance:

The company produced 5.79 lakh tonnes of Nitrogenous fertilizer against a target of 5.51 lakh tonnes during 1986-87 (Cooperative Year – July 1986 to June 1987). The capacity utilisation was 87 per cent of the installed capacity. The company is expected to register a production of 7 lakh tonnes of Nitrogenous Fertilizer against a target of 5.5 lakh tonnes during 1987-88 with a capacity utilisation of 105 per cent. The target for 1988-89 has been fixed at 5.71 lakh tonnes of Nitrogenous Fertilizer.

The plants functioned normally during the Cooperative Year 1987-88. The Ammonia and Urea Plants have been running above 100 per cent of total daily installed capacity. During the month of August 1987, the company set a record of production of 1.41 lakh tonnes of product of Urea (0.65 lakh MTs in terms of 'N'). This represented 138 per cent of the target for the month. The highest Urea despatch was 1.5 lakh MTs during the month of July, 1987.

The company is considering diversification schemes particularly in Petro-Chemical areas and in the field of Agro-based products. The company contemplates to implement a large scale project covering 3000 Hectares area of social forestry in the States of Gujarat, Madhya Pradesh and Rajasthan.

Financial results:

The company earned a profit of Rs. 45.06 crores during the year 1986-87 and is likely to earn a profit of Rs. 10.62 crores during the year 1987-88.

Industrial Relations:

The industrial relations during the period under report remained cordial.

Private Sector:

At present there are 9 large and 5 small fertiliser units producing nitrogenous and complex fertilisers and 70 small units producing single super phosphate (SSP) in the Private Sector with a total capacity of 18.77 lakh tonnes of nitrogen and [illegible] lakh tonnes of P_2O_5. The large private sector units are as under:

1. Gujarat State Fertilizers Company Lim
2. Shriram Fertilizers and Chemicals Lim
3. IEL Limited, Kanpur.
4. IEL Limited, Kanpur (Expansion Plan
5. Zuari Agro Chemicals Limited, Goa.
6. Mangalore Chemicals and Fertilizers L
7. Southern Petrochemicals Industries Corpo Tuticorin.
8. Coromandal Fertilizers Limited, Vizag
9. Gujarat Narmada Valley Fertilizers Co. L agar.

The DAP plant of Godavari Fertilizers Limited, Kakinada and the Ammonia plant Fertilizers Company Limited at Sikka are mence commercial production shortly.

The production of Fertilizers in the Privat 1987-88 is expected to be 16.13 lakh tonn and 8.60 lakh tonnes of P_2O_5 against the 17.78 lakh tonnes of Nitrogen and 7.6 lakh during 1986-87.

Sulphuric Acid:

Sulphuric Acid is one of the basic heavy in icals extensively used in various industries. of Sulphuric Acid goes in the manufacture o Phosphate and Phosphoric Acid. It is also us ufacture of other chemicals like sodium bic and intermediates, pharmaceuticals, deterg rayon, alum, Iron and Steel Industry and o gical and chemical industries are the other u of this item.

At present, there are 109 units in the co manufacturing sulphuric acid in various part try with a total annual installed capacity tonnes. An additional capacity of 12.5 lak annum has been approved and the same is stages of implementation. Except 6 units, all manufacturing sulphuric acid using sulphur al. The remaining 6 plants are producing from sulphur dioxide obtained from the roast ers or as a by product during the extractio zinc and copper from their ores.

The production and capacity utilisation of plants during the last 3 years is given in the page.

Production (1000 tonnes)	Capacity Utilisation (Percentage)
2,803.64	60.30
2,680.70	55.01
2,757.50	55.60

ere drought conditions in various parts of the demand for Single Super Phosphate fertilizer as anticipated. Since Single Super Phosphate major consumer industry of Sulphuric Acid , the demand for Sulphuric Acid has also stag- ng in under-utilisation of capacity.

Single Superphosphate (SSP):

Single Super Phosphate (SSP), a straight phosphatic fertilizer, is presently manufactured by 70 units. The total installed capacity of SSP is 6.10 lakh tonnes of P_2O_5 per annum.

The production of SSP during the last 2 years 1985-86 and 1986-87, was 3.39 lakh tonnes and 3.08 lakh tonnes respectively in terms of nutrient P_2O_5.

In addition to the above, a further capacity of 2.71 lakh tonnes of P_2O_5 in the form of SSP has been approved and the same is under various stages of implementation.

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    - (iv) Tetraethyl Ammonium Bromide (TEAB)

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The author, an expert on energy, in this unique compilation outlines the growth, the problems and the prospects of the various energy options. Broadly classified into two sources -- the Fossil Fuels or Non-Renewable Sources and Renewable Sources, the shifting trends in the demand for the various alternatives have been analysed.

National Energy Scenario: Annual Review 1987-88

Compiled by
T.P.S. RAJAN

I. FOSSIL FUELS

A. Coal

highlights of the year, 1987-88, are as follows:

. PLANNING

Planning Commission had assessed the demand of or the country, as a whole, at 155.70 million tonnes v coal including 5.50 million tonnes of middlings for rminal year of the Sixth Five Year Plan i.e. 1984-85. eet this demand, the coal companies were required to ice 152 million tonnes of raw coal by 1984-85. The industry, however, could not achieve this target and iced only 147.40 million tonnes of raw coal during -85. The situation was, nonetheless, met with considle ease as in the meantime, the pressure on coal had ewhat slackened. The country consumed only 139.58 ion tonnes of coal in 1984-85 as against the projected and of 155.70 million tonnes for that year.

he country's requirement of coal at the end of the Sev- Five Year Plan period in 1989-90 was originally sed by the Planning Commission at 237 million tonnes w coal. A mid-term appraisal exercise, however, indi- a down-ward trend in the consumption pattern of coal. now, estimated that the country might not require more 220 million tonnes of raw coal by 1989-90. The sector- demand will be as given in the table alongside.

Sector-wise demand of coal for 1989-90

(million tonne

Consuming Sector	Original	Revise
Steel and coke ovens (Coking coal)	41.10	36.0
Power	120.00	109.0
Railways	8.00	6.5
Cement	12.60	12.6
Fertilizers	6.50	5.5
Soft coke/LTC	5.00	3.5
Others	39.00	42.0
Export	0.50	0.3
Colliery consumption	4.00	4.0
Total	**236.70**	**220.0**

ssuming that the country will need 237.00 million es of raw coal by 1989-90, the Planning Commission fixed a production target of 226.00 million tonnes of coal for the coal companies for the same year. The bal- was to be met by the liquidation of pit-head stocks and some import of coking coal. With the down-ward revision of coal demand, the production plan has also been correspondingly modified. The coal companies are, now, planning to produce about 221 million tonnes of coal by 1989-90 as per details indicated below:

Production Plan for 1989-90

(Million tonnes)

Company	Projected production
Coal India Limited	192.31
Singareni Collieries Co. Limited	22.55
Others (TISCO, IISCO & DVC)	5.70
Total	**220.56***

* has been further reduced to 212 million tonnes.

In the Sixth Plan period, the coal production had achieved an annual growth of 7.2%. With production level now planned for 201 million tonnes of coal for the terminal year of the Seventh Plan, the annual growth will work out to about 8% during the current Plan period. To achieve growth in this task, the main thrust will be on augmentation of production from opencast mines by using heavy earth moving machineries and modern technologies.

The approved outlay for the coal and lignite sectors for the Seventh Five Year Plan period is Rs.7,400.58 crores. The broad break-up for various sectors is as follows:

(Rs. Crores)

Coal India Limited	6,000.58
Singareni Collieries Co. Limited	580.00
Neyveli Lignite Corporation Ltd.	700.00
Research & Development	120.00
Total	7,400.58

COAL PRODUCTION

The year 1986-87 was a landmark in the history of coal industry in as much as it was during this year that the country had achieved an all time high production of coal at 165.79 million and registered a growth of 7.5% over the previous year. The current year, 1987-88, appears to be ready to cross yet another milestone. The country is all set to achieve another all time high production of coal at about 183 million tonnes. Between April, 1987 and February 1988, a raised production of 160.42 million tonnes has already been registered which is about 14.24 million tonnes more than the production recorded during the corresponding period of the previous year and represents a growth of about 9.7% over the previous year — an achievement never before accomplished by the coal industry. The projected production of 183 million tonnes of coal for 1987-88 is calculated to come from different sources as follows:

Projected production during 1987-88

(Million tonnes)

	Production between April '87-February '88		Projected production for year as whole 1987-88	
	Target	Actual	Target	Projd.
Coal India Ltd.	140.21	139.29	158.50	159.25
Singareni Collieries Co. Limited	15.75	15.29	20.00	17.00
Others (TISCO, IISCO and DVC)	6.86	5.86	[illegible]	6.71
Total	162.82	160.42	183.00	183.00

The important feature to be noticed is of the total coal production in the country collieries of the Coal India Limited. This tinue in future as well and the CIL will dominant role in coal production in the important feature to be mentioned about C coal production from opencast mines has 18.0 million tonnes in 1973-74 to about in 1987-88 at the rate of about 20% per year duction from under ground mines has been the level of 60 million tonnes.

The situation is not very much different in There too the coal production from under-gr been maintained at the old level, while there siderable improvement in production from op

PRODUCTIVITY (OMS)

The output per man shift (OMS) has increasing in CIL collieries. While it was in 1985-86, it rose to 0.96 tonne in 1986-8 cipated to be 1.02 tonnes in 1987-88. Between and February, 1988, OMS in CIL collieries wa which means a growth of about 4.10% o recorded in the corresponding period of the p

An analysis of the OMS in under-ground mines of CIL shows that while productivity mines has increased from 0.76 tonne in 197 tonnes during 1987-88, the productivity in u mines has almost remained static at about 0. fact, there has been a slight decline in produ under-ground mines in the current year.

Overall output per manshift (OMS) in SCC 0.82 tonne in 1985-86. It became 0.80 tonne in is expected to be around 0.80 tonne in 1987- April 1987 and December 1988 this year, the recorded an OMS of 0.79 tonne. What is true ally in respect of CIL mines is also generally t of SCCL mines. Here too, the OMS from op has been steadily increasing from 2.94 tonnes to 4.70 tonnes in 1987-88 (anticipated) while t in underground mines has hovered around 0.4

SECTORWISE SATISFACTION OF COAL

The level of satisfaction achieved in this year tially higher than the level achieved in 1986-8 of augmented production, better planning and coordination with the transporting agencies, a e demand of coal of prime sectors, like, steel, to almost in full. A comparative position of vel achieved in the last year and during first the current year, as also projection for the ole, as given in the table below.

ll take is expected to be around 177.95 mil- as compared to 162.69 million tonnes in is will mean a growth of 9.4%.

AGE GROWTH IN RAIL DESPATCH

a been a significant improvement in coal by rail. As against 12,798 wagons loaded, on per day during April 86-February 87, the coal loaded 13,418 wagons per day during the same he current year.

D STOCKS

3.1988, pit-head stocks stood at 30.51 million

RICE

head price of coal is fixed by the Central Gov- nder the Colliery Control Order, 1945. Prior to revision of coal price w.e.f. 23.12.1987, the ruling al was fixed by Government on 9.1.1986. During ning period, the input cost of items like wages, stores, power, machineries etc. kept on rising — necessi taing an upward revision of the coal price. On a request made by the Government in 1985, the Bureau of Industrial Costs and Prices had undertaken a study to determine the normative cost of coal. The report of the Bureau became available to Government in October, 1987. The bureau had found sufficient justification for upward revision of coa price and had recommended an average price of Rs.210.00 per tonne for CIL coal to be effective from 1.1.1987. Taking into account the escalation in cost since 1.1.1987 the aver- age price of coal as in December, 1987 was worked ou at Rs.240/- per tonne. The Government, however, agreed to fix an average price of Rs. 219 per tonne only for CIL coal. The revised prices have already become operative wi effect from 23.12.1987.

The price of soft coke (a fuel used by common man in his kitchen) has not been revised. Its price has been delib- erately kept low at a subsidised rate of Rs.175 per tonne. The price of soft coke for industrial users also remains unal ered at the old rate of Rs.300 per tonne.

The price for SCCL coal has not been revised. The BICP as recently completed its study on SCCL.

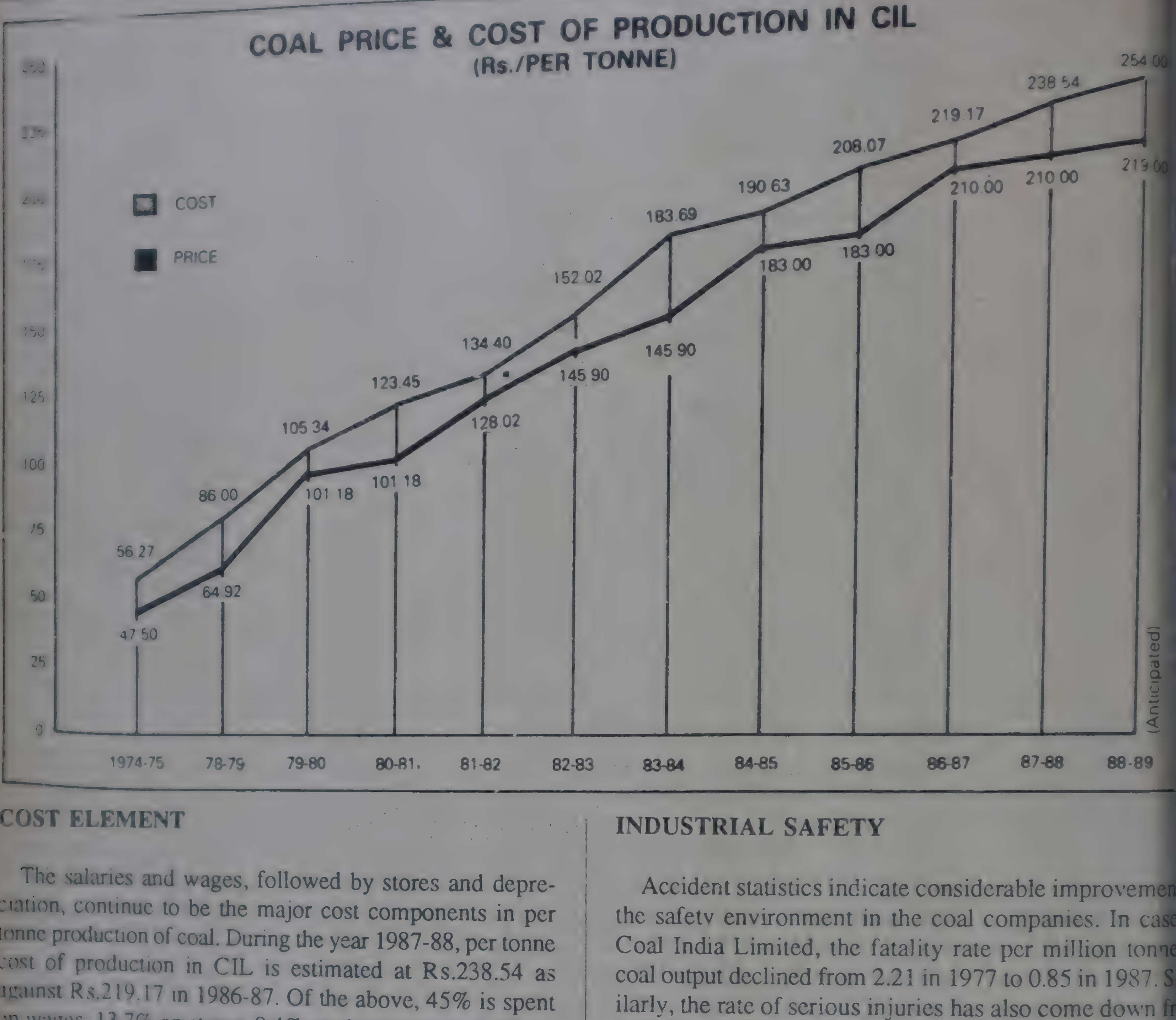
Inspite of recent revision in the price of coal, the gap between its administered selling price and its cost of pro- duction continues to persist. In fact, this is one of the chief reasons for continuing and accumulating losses of the Coal India Limited, as shown in the figure on next page.

Sector-wise satisfaction of coal demand -- From All Sources

(Million tonnes)

	1986-87		1987-88	
	(April 86- Feb. 87)	Full Year (1986-87)	(April 87- Feb. 88)	Full Year (1987-88 anticipated)
l Coke Ovens	21.09	23.39	21.14	25.20
ities	73.96	81.89	84.24	93.78
s	7.22	7.87	(1.81)	(2.50)
	7.73	8.54	7.60	4.25
	4.06	4.43	3.73	4.25
	1.86	2.04	1.74	2.00
cluding Brick Kilns, Captive power tc.	26.82	30.35	29.54	32.81
	0.12	0.16	0.17	0.16
consumption	3.66	4.02	3.59	4.00
	146.52	162.69	158.34	177.95
ia figures)	(1.86)	(2.01)	(1.81)	(2.50)

s in brackets indicate washery middlings.



COAL PRICE & COST OF PRODUCTION IN CIL (Rs./PER TONNE)

COST ELEMENT

The salaries and wages, followed by stores and depreciation, continue to be the major cost components in per tonne production of coal. During the year 1987-88, per tonne cost of production in CIL is estimated at Rs.238.54 as against Rs.219.17 in 1986-87. Of the above, 45% is spent on wages, 13.7% on stores, 9.4% on depreciation, 7.7% on interest, 6.8% on power, 4% on administrative expenses, 2.8% on transport and 10.6% on miscellenecous expenses.

COAL ROYALTY AND CESS ACCRUALS TO STATE GOVERNMENTS

Considerable revenues accrue to the Governments of the coal producing States by way of royalty and cesses imposed on coal. The following figures will speak for themselves.

(Rs. Crores)

Year	CIL Royalty	CIL Cess	SCCL Royalty	SCCL Cess
1982-83	59.80	171.27	5.14	10.67
1983-84	62.40	221.58	6.10	14.68
1984-85	65.50	432.96	6.07	29.58
1985-86	67.18	547.84	7.61	38.16
1986-87	73.20	661.79	9.20	40.13

INDUSTRIAL SAFETY

Accident statistics indicate considerable improvemen the safety environment in the coal companies. In case Coal India Limited, the fatality rate per million tonne coal output declined from 2.21 in 1977 to 0.85 in 1987. S ilarly, the rate of serious injuries has also come down fr 14.20 per million tonnes of output in 1977 to 3.45 per m lion tonne of output in 1987.

There has been considerable improvement in the Sing eni Collieries Company Limited in areas of mine safe The number of fatal accidents in the company has co down from 3.41 per million tonne of output in 1977 to 1. in 1987. The rate of serious injuries has also come do from 90.69 per million tonnes of output in 1977 to 18. in 1987.

Safety, however, is an area where complacency is co pletely out of place and, for this reason, the coal comp nies have been advised to remain ever vigilant and achi zero-accident rate as early as possible.

NEYVELI LIGNITE CORPORATION

Neyveli Lignite Corporation continued its excellent pe formance in the current year. This will be evident from t following figures

	1987-88 (upto Dec. 1987)		1986-87	
	Expected	Actual	Target	Actual
(lakh es)	96.50	70.07	76.19	85.22
generation lion units)	5,820	4,531	4,108	5,111
tonnes)	1,18,600	85,105	1,26,000	1,28,003
(tonnes)	2,28,600	1,65,436	2,30,000	1,92,400

986-87, thermal power station-I achieved a plant load of 75% as against the national average of 53.2%. The r station received the Meritorious Productivity Reward performance in 1986-87 for the 4th year in succession.

uring 1986-87, the Corporation earned a net profit of 7.21 crores which is the highest ever profit recorded he company since its formation in 1956.

LC's contribution to Central and State exchequer by of taxes and dues amounted to Rs.52.43 crores in -87.

AL EXPLORATION AND DRILLING

coal reserves of India, as per assessment made by the logical Survey of India upto 1.1.1988, are 1,70,460.54 ion tonnes for coal seams of 0.5 metre and above in kness down to a depth of 1200 metres. The distribution oal reserves in the different states is as under.

te	Million Tonnes
dhra Pradesh	10,435.50
nachal Pradesh	90.23
sam	280.03
har	57,570.90
dhya Pradesh	26,852.93
harashtra	5,075.40
ghalaya	458.94
galand	12.05
issa	39,662.82
est Bengal	30,021.74
tal	**1,70,460.54**

The category-wise reserves are given in the table alongde.

Geological Survey of India is responsible for regional lling and preparation of preliminary geological reports.

Category-wise Coal Reserve

Type of Coal	Proved	Indicated	Inferred	Total
Gondwana Coals	49,247.39	70,352.12	50,019.78	16,919.29
Tertiary Coals	128.89	220.08	492.28	841.25
Grand Total	**49,376.28**	**70,572.20**	**50,512.06**	**17,460.54**

On the basis of these geological reports, potential blocks are demarcated and then detailed exploration for coal is taken up by the Central Mine Planning and Design Institute (CMPDI) in conjunction with the Mineral Exploration Corporation Ltd. (MECL) keeping in view region-wise demand of coal for the various plan periods. The detailed drilling forms the basis for drawing up feasibility studies and detailed project reports for coal mining projects and washeries etc. Besides this, geo-engineering investigation in Ghusick block, Raniganj coalfield were conducted and the data were analysed for the British Mining consultants. Under UNDP Scheme, an executive was trained in U.K. in Mine Modelling.

RESERVE ESTIMATION

A total of 4,422 million tonnes of additional coal reserves were estimated during April 1987 to December 1987. Out of this 3,713 million tonnes were estimated under proved category, 706 million tonnes under 'indicated' category and 3 million tonnes under 'inferred' category. Of the new reserves, 865 million tonnes are amenable to open cast method of mining. State-wise breakup of the reserves is given below:

(In Million Tonnes)

State	Proved	Indicated	Inferred	Total
West Bengal	673.22	32.02	--	705.24
	(14.74)			(14.74)
Bihar	2,379.374	628.673	--	3,008.047
	(395.14)	(67.205)		(462.345)
Orissa	--	34.96	--	34.96
M.P.	532.292	10.95	2.94	546.182
	(332.81)			(332.81)
Maharashtra	120.49	--	--	120.49
	(48.24)			(48.24)
Assam	7.50	--	--	7.50
	(7.50)			(7.50)
Total	**3,712.876**	**706.603**		**4,422.419**
	(798.43)	**(67.205)**		**(865.635)**

(Figures within brackets are quarriable reserves)

PERSPECTIVE PLAN OF EXPLORATION

.The drilling programme to be carried out from 87-88 to 91-92 is given on the table on next page.

Year	Merta RD	NEC	ECL	BCCL	CCL	WCL	SECL	NCL	T
1987-88	20,000	12,000	95,000	19,000	55,000	67,000	130,000	3,000	40
1988-89	5,000	4,000	92,000	10,000	59,000	67,000	132,000	10,000	37
1989-90	--	3,000	93,000	15,000	59,000	67,000	144,000	12,000	39
1990-91	--	--	95,000	10,000	48,000	60,000	147,000	8,000	36
1991-92	--	--	95,000	10,000	48,000	60,000	147,000	8,000	36

DISTRIBUTING COAL

(a) Railways

The coal supply programme for the railways is drawn up by the Chief Mining Adviser, Railway Board, Dhanbad, in consultation with the Coal India Limited. During the period from April to December, 1987, 5.45 million tonnes of coal was supplied to the railways against an assessed demand of 7.70 million tonnes for the year 1987-88 as a whole and an off-take of 7.87 million tonnes in 1986-87. To ensure proper quality of coal, the Railway Board has set up an Inspection Unit for joint supervision of the commodity at the loading points.

(b) Steel Plants

The allocation of coking coal to the steel plants is made by the Coal Controller at monthly coal-allocation meetings which he holds jointly with the consumers, producers and the railways. Regular meetings are also held at Coal India level with the representatives of the steel plants and the railways to coordinate uninterrupted supply of coking coal to steel plants. The Ministry of Programme Implementation also keeps an eye on supply of coking coal to steel plants. In order to augment supplies and meet future requirement of coking coal to steel mills, new projects are being sanctioned and washing capacity of the washeries is being expanded. During the period from April to December, 1987, about 9.17 million tonnes of coking coal was supplied to steel plants. The off-take of coal (in terms of raw coal) by steel plants/washeries and coke ovens during 1986-87 was 23.39 million tonnes as against 24.49 million tonnes in 1985-86. During the period from April to December this year, supply of raw coking coal to steel plants, washeries and coke ovens has been of the order of 17.17 million tonnes. The projected demand of the sector for 1987-88 is 31.10 million tonnes.

To safeguard against any shortfall in availability of coking coal to the steel mills and improve blending quality of the ndigenous product, a small quantity (about 2.5 million onnes) of coking coal is imported every year. Stock of king coal with steel plants, as in January 1988 was satisfactory.

(c) Power Stations

The allocation of coal to thermal power stations is on a quarterly basis by the Standing Linkage Com with members drawn from the Coal and Power D ments, Central Electricity Authority, Railways, Pla Commission etc. Considering the importance of the plies to power-houses for thermal generation, the m ment of coal to power stations continues to be mon at the highest level by the Cabinet Committee on Ind Infrastructure. The monitoring is also done at various levels, including the concerned State Electricity Bo Zonal Railways and the Coal Companies. As a res such coordinated efforts, the coal supply to thermal p stations increased from 75.08 million tonnes in 1985- 83.90 million tonnes (including washery middling 1986-87, recording an increase of 8.02 million tonn 11.7%.

Raw coal despatch to thermal power stations during to December, 1987 was about 67.44 million tonnes as pared to 58.86 million tonnes during the correspon period of the previous year which shows an increase of million tonnes or 14.6%. During this period, the powe tions also received 1.28 million tonnes of middling against 1.52 million tonnes received during Apr December, 1986. The demand of thermal power station 1987-88 is estimated at 92.80 million tonnes of coal 3.90 million tonnes of washery middlings. This does take into consideration the demand of captive power pl It is expected that the actual supplies to power houses du the year will exceed the estimated demand and scale an 95 million tonnes of raw coal.

(d) Cement

The allocation of coal to cement plants is also do the Standing Linkage Committee which meets every ter to review and assess the demand of the cement p and establish linkages for supply of coal to them. As ag the actual off-take of 7.89 million tonnes in 1985-86, off-take of cement plants during 1986-87 was 8.54 mi tonnes. This year, upto December 1987, the off-take been 6.21 million tonnes. The year is expected to end an off-take of 9 million tonnes.

CH-REACHING COAL TO CONSUMERS

duction of coal is only half the job done. The other perhaps, more important is to reach the coal to ming points on right time and in right proportion. is achieved by a combination of transporting agen- re important of which are the railways, roadways, o round system, conveyor belts and the rail-cum- e carriers. The share of different modes of trans- n in the total system is roughly as follows:

vays	67%
lways	11%
.R.	10%
r (Ropeways, Belt conveyors ail-cum route carriers etc.)	12%
al	100%

will talk more about the movement of coal by the ys and the rail-cum-sea route in the following par- ns.

MOVEMENT

Railways constitute the major system of coal trans- ion in India as about 67% of the coal is transported e railways. Incidentally, the Coal is also the largest commodity transported by the Railways and consti- about 41% of the total railway goods traffic. The atch of coal by rail is either governed by the prefer- l traffic schedule of the Indian Railways or is done in rdance with the programme of movement as sponsored e various sponsoring authorities and accepted by the ays.

he railways transported 108.63 million tonnes of coal coke from collieries and washeries of CIL, SCCL, CO and IISCO during 1986-87 (Annexure IV). The tar- for rail transportation of coal for 1987-88 has been fixed 25 million tonnes. During the first nine months of the the railways have carried 84.17 million tonnes of coal oke from all the sources i.e. Coal India Limited, SCCL, CO and IISCO as against 79.22 million tonnes carried ng the corresponding period in the previous year.

L-CUM-SEA MOVEMENT OF COAL

oal requirement of some of the consumers in Southern a is met via rail-cum-sea route to obviate difficulties erienced in movement of coal via rail route only from gal, Bihar coalfields. Requirement of Tuticorin ther- power station and Ennore thermal power station of Tamil Nadu Electricity Board is being met in full via rai cum-sea route. At the forwarding-end Haldia, Paradip an Vizag ports handle the shipment which averages approx- imately 4 lakh tonnes per month. During 1986-87, a tota of 34.23 lakh tonnes of coal was moved via rail-cum-se route for these two power stations. This year, upt December, nearly 34 lakh tonnes of coal was moved by rai cum sea route.

EXPORT OF COAL

Export of coal from India is channelised through the Min- erals and Metals Trading Corporation. The main and tra- ditional buyers of Indian coal are Nepal, Bangladesh and Bhutan. Since 1984-85, a small quantity of Special Low Volatile (SLV) coal is being exported to South Korea also. The total coal exports amounted to 0.16 million tonnes during 1986-87 as against 0.22 million tonnes during 1985-86. The quantity of coal exported in the current year from April to December, 1987 was 0.11 million tonnes as against 0.08 million tonnes exported during the same period of the previous year.

B. Lignite

NEYVELI LIGNITE CORPORATION

The South Arcot District of Tamil Nadu is richly endowed with lignite deposits. The Neyveli area of this district con- tains about 3,300 million tonnes of lignite reserves of which about 2,000 million tonnes are of proven category. Recently, more deposits have been discovered in the nearby Bahur area. Smaller deposits of lignite occur elsewhere in India in Gujarat, Rajasthan and Jammu and Kashmir.

The Neyveli deposits are worked by the Neyveli Lignite Corporation Limited, a public sector enterprise of the Gov- ernment of India. NLC has been entrusted with the devel- opment of lignite mining in Rajasthan also.

NLC is an integrated complex consisting of lignite mines and linked thermal power stations, a briquetting and car- bonisation plant, a fertilizer plant based on oil and a clay washing plant. The production capacities of these units are as follows:

Lignite Mine I	: 6.5 mil. tonnes per annum.
Lignite Mine II	: 4.7 mil. tonnes per annum.
TPS I	: 600 MW
TPSII Stage I	: 3 x 210 MW
B & C Plant	: 3,27,000 tonnes per annum
Fertilizer Plant (Urea)	: 1,52,000 tonnes per annu

Several expansion schemes are under implementation at present. The capacity of the second mine is being expanded from 4.7 million tonnes to 10.5 million tonnes per year. The installed generating capacity of TPS II is being increased from 3 X 210 MW to 1470 MW by adding four units of 210 MW each. For evacuation of power, a transmission scheme costing Rs. 258.71 crores is under implementation. In addition the following proposals are under consideration.

Expanding the capacity of Mine I from 6.5 million tonnes to 10.5 million tonnes per year.

-- Setting up of 2 X 210 MW units linked to Mine I Expansion.
-- Addition of one unit of 210 MW to TPS II, Stage I.
-- Opening of a third mine cut of 11 million tonnes per year.
-- Establishing TPS III (3 X 500 MW) linked to Mine III.
-- Development of lignite mines in Palana-Barsinghsar area of Rajasthan.
-- Setting up of a power plant of 2 X 120 MW at Palana-Barsinghsar.

PERFORMANCE OF THE CORPORATION

Production

Neyveli Lignite Corporation continued its excellent performance in 1986-87 and during April-December, 1987. Production target and the actual production figures for the year 1986-87 and for 1987-88 (April-December 1987) and the expected production for the year 1987-88 are given in the table below:

Unit	Expected Production in 1987-88	Actual Prodn. in Nine months (April-Dec. 87)	Production in '86-87 Target	Actual
Lignite (lakh tonnes)	96.50	70.07	76.19	85.22
Power Generation Gross (Mill. Units)	5,820	4,531	4,108	5,111
Urea (tonnes)	1,18,600	85,105	1,26,000	1,28,003
Coke (tonnes)	2,28,600	1,65,436	2,30,000	1,92,410

CAPACITY UTILISATION

Capacity utilisation of various units against targets during 1986-87 was as follows:

	Capacity Utilis	
	1986-87	19 (A Dec
Mines (Overburden+Lignite)	125.83	11
Thermal Power Stations	124.42	11
Fertilizer Plant	101.59	9
Briquetting and Carbonisation plant	83.66	9

New production records were created in 1986-87. lignite output at 70.36 lakhs tonnes in Mine I is a new re for any year since inception. The total output from the plex in 1986-87 in respect of overburden removal (lakhs cub. metre), lignite production (85.22 lakhs ton gross generation of power (5,111 million units) and ex of power to Southern States (3,977 million units) are highest achieved for any year so far.

In 1986-87, Thermal Power Station-I achieved a p load factor of 75% as against the national average of 53. The power station received the Meritorious Producti Reward for its performance in 1986 for the fourth yea succession.

Unit-III of Second Thermal Power Station-Stage-I, wh was commissioned in March, 1986, generated 1,067 M during its first year of operation as against the Central El tricity Authority target of 690 M.U.

Overhaul of specialised mining equipment in the min boiler and units overhauls in thermal power station, plann maintenance in the fertilizer plant and preventive main nance in the Briquetting & Carbonisation plant were c ried out.

FINANCIAL PERFORMANCE

The authorised capital of Neyveli Lignite Corporation Rs.1,140 crores. The investment in the Corporation up December, 1987 was as under:

	(in Rupees Crore
Equity	863.13
Loan	264.51
Total	1,127.64

Reserves and surplus accumulation upto 31.3.19 amounted to Rs. 301.69 crores against Rs. 233.96 cror upto 31.3.1986.

986-87, the Corporation earned a net profit of ores which is the highest profit recorded by the since its formation in 1956. NLC's contribution and State exchequers by way of taxes and duties to Rs.52.43 crores during 1986-87. The value employee during 1986-87 was Rs.92,217 as s.69,860 for the previous year.

urnover during 1986-87 was Rs.232.59 crores as Rs.174.47 crores of the previous year. The vise break up of the turn-over was as follows:

	Sales turn-over during 1986-87 (Rs. Crores)
sales to outsiders)	4.12
	167.30
	30.06
	23.08
roducts	8.03
	232.59

was excellent response from medium and small s to NLC's 'A' series Bond issue in 1986-87. As the issue amount of Rs. 50 crores, the total sub- n amounted to Rs. 61.27 crores. NLC's 'B' series s for the value of Rs. 85 crores was opened for public ption for 3 days between 30th October, 1987 to 2nd ber, 1987. The actual amount mobilised through this as Rs.88.83 crores.

e: Report for 1987-88. Ministry of Energy, Dept. of

Petroleum and Natural gas

ORMANCE AT A GLANCE

production of crude oil in 1987-88 is likely to be r less of the same level as that of 1986-87. The target luction for the year is 30.46 million tonnes.

re has been substantial increase in the supply of nat- as. As against 5040 million cubic meters in 1986-87, C's gas supplies during 1987-88 are expected to be million cubic metres.

strikes at GS-16 in Krishna Godavari Offshore area, nagiri in Cauvery basin, Kumchai in Arunachal Pra- gas find at Agartala Dome in Tripura were the major veries during the year. Another noteworthy feature has been the detection of oil accumulation from the igneous basement in the Bombay Offshore area.

As against the target of 45.08 MT in 1986-87, the oil refineries processed 45.70 MT of crude oil during the year representing an achievement of 101.4% of the target and 97.9% of the capacity. The target for 1987-88 is 48.04 MT against which approximately 35.31 MT of crude has been processed during April-December, 1987.

The oil industry has set up a target of enrolment of 13 lakh new LPG customers during 1987-88. The actual enrolment during the period April-December 1987 was 10.6 lakhs. To cope with the increasing volume of products, the Oil Companies commissioned 106 retail outlets and 147 LPG distributorships during the period April-December, 1987.

During 1987-88, allocation of kerosene to the State/ Union territories would be about 71,56,869 tonnes representing a growth of 8.3% over the allocation in 1986-87. This includes 5% increase over the allocation in the corresponding block of 4 months of the previous year and also adhoc allocation to meet the specific situation like flood, drought and shortage of other alternative domestic fuels. Owing to the extremely unfavourable monsoon in the country in 1987, drought conditions developed in most parts of the country, the situation being more serious in the North-Western region, which led to a substantial increase in the demand for petroleum products, particularly of High Speed Diesel (HSD). There was higher demand for kerosene also from a few States affected by floods. All the demands however, were met by and large in full.

The first section of the HBJ Pipeline from Hazira to Bijaipur was commissioned in record time on 19th August, 1987 and the Bijaipur Fertilizer Plant is drawing natural gas from that date. During 1987-88 the gross imports of crude oil and petroleum products are estimated to be 18.3 million tonnes and 4.8 million tonnes respectively as per the latest outlook. The gross foreign exchange requirements for these imports is likely to be about Rs. 4336 crores. After accounting for exports of our products, the net import of crude oil and petroleum products during 1987-88 is estimated to be 18.3 million tonnes and 1.9 million tonnes respectively valued at Rs. 3787 crores approximately.

PLAN OUTLAY

Plan Outlay 1987-88 (BE) of the Ministry of Petroleum & Natural Gas was Rs. 3265.00 crores. The Revised Plan Outlay has been fixed at Rs. 3414.99 crores with a budgetary support of Rs. 486.08 crores and balance of Rs. 2928.91 crores to be met through internal and extra-budgetary resources.

MAJOR PROJECTS APPROVED DURING THE YEAR

Installation of five captive gas turbine sets of 3 MV capacity each at Galeki, Wakwa and Rudrasagar at an estimated cost of Rs. 26.03 crores with a foreign exchange component of Rs. 12.87 crores have been approved.

Oil India Limited (OIL) signed a loan agreement with the World Bank for loan of US $140 million for its exploration and production improvement and ONGC negotiated a World Bank loan of US $295 million for its Western Gas Development Project.

A Memorandum of Understanding was entered into on 22.5.87 between Government of India, Indian Oil Corporation and Tata Chemicals Limited for setting up a 6 MTPA grass root refinery at Karnal in Haryana in the Joint Sector.

A tripartite Memorandum of Understanding was entered into on 26.6.87 for preparing a detailed project report for 3 MTPA Petrochemical Refinery at Mangalore in Karnataka in the joint sector which will have M/s. Hindustan Petroleum Corporation as the public sector promoter and M/s. Indian Rayon Industries Limited as the private sector co-promoter.

First stage approval was given for modernisation of the Digboi refinery. Approval was given for the preparation of detailed feasibility report for setting up facilities to manufacture 45,000 tonnes per annum of N-Paraffins at the Vizag Refinery of HPCL and for the seperation of polyester grade propylene at the Mathura Refinery.

To restrict the consumption of Motor Spirit which has been increasing at a rapid rate, the basic ceiling price of the product was increased by Rs.1000/- per Kl. with effect from 9.1.1988.

People living in hilly areas have to bear the burden of higher transport costs in the supply of Kerosene and LPG today, some freight subsidy is given on Kerosene in areas like North Eastern States and Jammu & Kashmir. It has now been decided to give freight concession to all hilly areas in the country. Similarly, it has been decided that LPG cylinders would be supplied to the customers in all hilly areas at the same price as for the customers in the nearest point in the plains. This will also, to a large extent, help in conserving the forest resources used for purposes of ligh fuel. A scheme is being worked out to implement these c cessions.

NATURAL GAS

Exploration and Production

OIL & NATURAL GAS COMMISSION

The Oil & Natural Gas Commission continued th exploration and production activities during the year as p plan. The major highlights of this year are:

-- Oil was struck in GS-16 structure in KG off-shore a at Bhuvanagiri in Cauvery onland basins.

-- Gas was struck at Agartala Dome in Tripura.

-- Production from five new structures commenced Kovilkallapal, South Malpur, North Kathana, Pakha and Barsilla.

-- Deepest well Madhubani-I drilled to a depth of 59 metres.

-- Drilling operations commenced in Kerala-Konkan of shore.

-- Agreements have been signed with five parties for supp of gas of the order of about 63 thousand cubic mete per day from KG Basin. In addition agreement for supp of about 4000 cubic metres of gas per day has been signe with Indian Steel Rolling Mills, Nagapatnam.

-- For the first time in India sub-sea completion system ha been used to put four wells on production in Bomba offshore area.

PRODUCTION

During 1986-87 ONGC produced 27.86 million tonne of crude oil out of which 20.62 million tonnes was fro off-shore and 7.24 million tonnes from onshore fields. Th crude oil production during 1987-88 is expected to be 27.6 million tonnes (7.70 million tonnes from onshore and 19.9 million tonnes from offshore fields). The production til December, 1987 was 20.773 million tonnes out of which offshore contributed 14.975 million tonnes.

The gas supplies during 1987-88 are expected to be 558 million cubic metres out of which 4500 million cubic meters is expected to be produced from offshore. The supply til November, 1987, were 3801.7 million cubic metres.

SIVE INTEGRATED EXPLORATION RAMME WITH SOVIET ASSISTANCE

er the agreement signed between ONGC and V/O. -export in October 1985, Intensive Integrated Explo- is being conducted in Cauvery and Cambay basins a long term Soviet credit.

smic survey in Cauvery basin started in July, 1986. esent, two seismic parties are operating in Cauvery and at the end of November 1987, they have com- d 885.70 GLK. Drilling of first parametric well in this was commenced at Sattapadi well No.1 on the 20th ember, 1987. At the end of November 1987, the well been drilled to a depth of 708 metres.

eismic survey in Cambay (North) basin started in ember, 1986. Till November, 1987, the two seismic par- working in the basin covered 889.25 GLK. Drilling of parametric well in this basin started at Patan on Sep- ber 4, 1987. As at end November 1987, the well reached pth of 2,612 metres.

n pursuance of the agreement of November 27, 1986, ween India and the Soviet Union, another Intensive Inte- ted Exploration Project has been started in West Bengal hore. The feasibility report submitted by V/O. Techno- port of the U.S.S.R. for executing the project has been epted. As per the agreed work programme, first well in project area will be spudded in the 4th quarter of 1988.

XPLORATION ACTIVITIES

Surveys: A total of 980.5 standard line km of seismic rvey has been completed in Assam and Arunachal Pra- esh during April to November 1987, against an annual rget of 2200 SLKM.

The survey work was badly affected due to severe floods Assam during the year. The seismic survey data was pro- essed by OIL's own computer at Duliajan. Presently seis- ic surveys are being conducted at Talap, Sonari, Sapekati, ido-Likhapani-Jagun, Tinsukia-Makhum and North of rahmaputra. It is expected that the annual target of 2200 LKM of seismic survey in Assam and Arunachal Pradesh ill be achieved during the year 1987-88.

The computer centre at Jodhpur has processed a total of 150.25 std line km of seismic data during the year. In orth-East Coast/Andaman Offshore areas 5600 line km f seismic survey and 5000 line km of geochemical survey ill be carried out during the year.

PRODUCTION ACTIVITIES

The OIL's crude oil production during April to November 1987 is 1.83 million tonnes against the original annual target of 2.84 million tonnes. Total crude oil production during the year is expected to be 2.55 million tonnes. During the period, OIL's crude oil pipeline has transported/delivered a total of 3.42 million tonnes of crude oil to the public sector refineries in Assam and Bihar which includes 1.82 million tonnes of crude oil from ONGC. OIL also has supplied 504.49 million cubic metres of natural gas to various industries in Assam and also to Assam State Electricity Board. OIL's LPG plant has produced 29,113 tonnes of LPG against the annual target of 48,000 tonnes. It is expected that the target of 48,000 tonnes of LPG will be achieved during the year 1987-88.

PETROLEUM REFINERY

The installed refining capacity in the country at the end of 1987 was 46.70 MTPA spread over 12 refineries. The names of the refineries and their installed capacity are given below:

	(in mill. tonnes)
Indian Oil Corporation Ltd., Gauhati	0.85
Indian Oil Corporation Ltd., Barauni	3.30
Indian Oil Corporation Ltd., Koyali	8.10
Indian Oil Corporation Ltd., Haldia	2.50
Indian Oil Corporation Ltd., Mathura	6.00
Indian Oil Corporation Ltd., Digboi, (Assam Oil Division)	0.50
Madras Refineries Ltd., Madras	5.60
Cochin Refineries Ltd., Cochin	4.50
Bharat Petroleum Corpn. Ltd., Bombay	6.00
Hindustan Petroleum Corporation Ltd., Bombay	3.50
Hindustan Petroleum Corp. Ltd., Vizag	4.50
Bongaigaon Refineries & Petro-chemicals Ltd., Bongaigaon	1.35
	46.70

In addition to the above there is a swing capacity of 2.00 MTPA in HPCL's Bombay Refinery.

The crude throughput in the refineries rose from the level of 25.84 MT in 1980-81 to 45.70 MT in 1986-87. The crude throughput envisaged for 1987-88 is 48.04 MT out of which a throughput of 35.31 MT has already been achieved in the first nine months. The targetted throughput for 1988-89 i 48.90 MT.

Government have decided that a 6.0 MTPA grass root refinery be set up at Karnal, in Haryana, in the joint sec ter. The Joint Venture Co. will have M/s. Indian Oil Corporation as the public sector promoter and M/s. Tata Chemicals Limited will be the private sector co-promoter. Each of them will hold 26% of the equity and the rest will be raised from the public. A Memorandum of Understanding has been entered into on 22.5.87 between Government of India, Indian Oil Corporation and Tata Chemicals Limited for setting up this refinery.

Similarly, Government has also decided that a detailed Project Report should be prepared for a 3 MTPA Petrochemical refinery at Mangalore, in Karnataka, in the joint sector. This Joint Venture Co. will have M/s. Hindustan Petroleum Corporation as the Public sector promotor and M/s. Indian Rayon Corporation as the private sector co-promoter. Each of them will hold 26% of the equity and the balance will be raised from the public. A tripartite Memorandum of Understanding has been entered into for this on 26.6.87. Apart from the above, the capacity of the Mathura Refinery is being expanded from 6.00 MTPA to 7.5 MTPA and the capacity of the Koyali Refinery is being expanded from 7.3 MTPA to 9.5 MTPA. The Koyali Refinery has already reached a capacity of 8.1 MTPA. The Bongaigaon Refinery has also been expanded from 1.0 MTPA to 1.35 MTPA by debottlenecking measures.

Government have approved the installation of the first Hydrocracker Unit in the country at the Koyali Refinery. Work on this project has already started and is expected to be completed by February, 1992. This Project is estimated to cost Rs. 635 crores. Government have also given first stage approval for modernisation of the Digboi Refinery, which is the oldest refinery in the country. A Detailed Feasibility Report for this is under preparation by the Indian Oil Corporation. Another proposal for setting up a new refinery in Assam is under the consideration of Government.

The Cochin Refinery is setting up facilities for production of 87,200 tonnes per annum of Benzene at an estimated cost of Rs. 75.80 crores as well as facilities for manufacture of 12,000 tonnes per annum of Toluene. Madras Refineries is also executing a project for the manufacture of 17,000 tonnes per annum of Propylene at an estimated cost of Rs.13.80 crores.

Government have conveyed approval for the preparation of detailed feasibility reports for setting up facilities to manufacture 45,000 tonnes per annum of N-Paraffins at the Vizag Refinery of HPCL and for the separation of Polyester Grade Propylene at the Mathura Refinery. The Polyester Staple Fibre Plant at the Bongaigaon Refinery has been mechanically completed in October, 1987 and trial production activities are in progress. The refineries are also i menting a number of energy conservation schemes w include revamping/replacing of low efficiency furnac high efficiency ones, addition of air preheaters, additi more heat exchangers and replacement of the old low ciency boilers.

INDIAN OIL CORPORATION LIMITED (REFINERIES & PIPELINES DIVISION)

Operations

The operating refineries at Guwahati, Barauni, Guj Haldia, Mathura and Digboi are expected to process 2 million tonnes of Crude Oil during 1987-88. The refin wise position is given below.

(Figures in Million ton

Refinery	Actuals (April - Nov. 87)	Total expected crude throughput for '87-88	Target 1988-8
Guwahati	0.54	0.80	0.800
Barauni	1.76	2.94	3.100
Gujarat	5.57	8.20	8.300
Haldia	1.86	2.79	2.625
Mathura	4.17	6.57	6.550
Digboi	0.37	0.52	0.525
	14.27	**21.82**	**21.900**

Pipelines

The performance of various pipelines under IOC for period upto November 1987 and target for the full y 1987-88 is as follows:

(Qty. in million tonn

Unit	Actual performance (Apr. -Nov. '87)	Total e pectatio during the yea
Guwahati-Siliguri (PP)	0.406	0.550
Koyali-Ahmedabad (PP)	0.803	1.100
Barauni-Kanpur (PP)	1.165	1.760
Haldia-Barauni (PP)	0.691	0.965
Haldia-Mourigram-Rajbandh (PP)	0.798	1.170
Mathura-Jalandhar (PP)	1.904	2.670
Salaya-Mathura (CP)	6.590	9.900
Digboi-Tinsukhia (PP)	0.300	0.428
	12.657	**18.543**

(PP) - Product Pipeline; (CP) - Crude Pipeline.

D. Derived Sources

I. ELECTRICITY

LIGHTS

ng the year, the National Thermal Power Corpora- mmissioned the second 500 MW unit at Singrauli e first 500 MW unit at Korba ahead of schedule. It ommissioned the third 200 MW unit at Farakka and st 210 MW unit at Vindhyachal. During April, 1987, ruary, 1988, the Corportion's stations, including the pur Thermal Station managed by NTPC, achieved a Load Factor of 72.36% as compared with the PLF .39% in the corresponding period of 1986-87. A Mem- lum of Understanding for the year 1987-88 signed en NTPC and Department of Power identifies the per- ance targets to be achieved by the NTPC during the The Memorandum stipulates the action to be taken ie Government to enable the achievement of the tar- During the year NTPC received the Excellence in Per- ance Award for 1985-86. Its Korba project was dged as the best environmentally managed industrial in Madhya Pradesh. The Vindhyachal and Rihand pro- s of NTPC were given safety awards by the National ty Council of U.S.A. in July and August, 1987, respec- ly. In 1986-87 the Corporation earned a profit of 211.8 crores after tax. The profit in 1985-86 was 182.16 crores.

he profits earned by the National Hydroelectric Power poration and the Rural Electrification Corporation in 6-87 were Rs.19.25 crores and Rs.23.8 crores respec- ely, as compared with the respective profits of Rs.18.79 res and Rs.16.19 crores earned in 1985-86. The Dam- ar Valley Corporation and the North-Eastern Electric wer Corporation earned profits of Rs.44.21 crores and .2.73 crores in 1986-87 respectively. The profits earned these organisations in the previous year were Rs.40.98 ores and Rs.1.17 crores respectively.

As a result of the widespread drought and the low reser- ir levels, hydel generation during the year is expected to ll short of the programme by about 9 billion units. A con- gency plan was implemented to augment thermal gen- ation. By and large, the power requirement of the ricultural sector has been met in full. Thermal genera- n during April, 1987 to February, 1988 increased by about .3% as compared with the corresponding period of the evious year. The all-India Plant Load Factor during April 87 to February, 1988 was 56% as compared with a target 53.2% and the PLF of 53.2% in 1986-87.

The Government of India has launched an incentiv awards scheme for the reduction of transmission and distribution losses by the State Electricity Boards (SEBs). Under the scheme, the SEBs and their Distribution Division which achieve a prescribed reduction in the T&D losse would be given cash awards. Individuals as well as institutions and organisations which develop scientific device or make practical suggestions for the reduction of T&D losses also qualify for awards under the scheme.

POWER GENERATION

The total energy generation in the country during 1986-87 was 187.56 billion units which was an increase of 10.3% over the generation in 1985-86. The increase in thermal generation during 1986-87 over the previous year was 12.9 per cent. This was mainly due to the better performance of thermal power stations in the country, which achieved an all-India Plant Load Factor of 53.2 per cent during 1986-87.

For the year 1987-88, a generation target of 205 billion units has been fixed, comprising 143 billion units thermal, 5.6 billion units nuclear and 56.4 billion units hydro. This envisages an increase of 9.3 per cent over the generation achieved in 1986-87.

During April, 1987 to February, 1988, hydel generation in the country was about 8.2 billion units less than the programme due to the low reservoir levels. This shortfall was partly off set by implementation of a contingency plan to increase thermal generation which exceeded the programme for April, 1987-February, 1988 by 5.4 billion units. The total generation during this period was 183.8 billion units which is 7.8% more than the generation during the corresponding period of the previous year. The actual generation during the first eleven months of the year (April-February) as compared with the programme is given below:

(Billion Units)

Generation	Program	Actual	% of programme	% of last year
Thermal	130.13	135.53	104.1	116.3
Nuclear	5.13	4.65	90.5	101.0
Hydro	51.98	43.64	84.0	88.3
Total	**187.24**	**183.82**	**98.2**	**107.8**

PLANT LOAD FACTOR OF THERMAL STATIONS

Thermal capacity at present constitutes over 67% of the total installed capacity in the country and contributes about

69.8% of the total power generation. At the beginning of the Sixth Five Year Plan, the performance of thermal power stations was unsatisfactory with a Plant Load Factor of 44.3%. To improve their performance a number of measures were taken to achieve optimum utilisation of the existing thermal units. During 1984-85, the PLF improved to 50.1 per cent and increased to 52.4 per cent in 1985-86. During the year 1986-87, the PLF increased to 53.2%. During the period April, 1987 to February, 1988, the PLF further increased to 56%.

During the period April, 1987 to February, 1988 the following State Electricity Boards and Corporations achieved a PLF higher than the all-India average of 56%.

State Electricity Board/Corporation	PLF%
Rajasthan	70.7
Punjab	72.7
Gujarat	59.3
Maharashtra	56.4
Andhra Pradesh	75.8
Tamil Nadu	68.1
Karnataka	62.6
NTPC	70.9
Neyveli Lignite Corporation	69.5
Ahmedabad Electricity Co.	63.9
Trombay (Tata Electric Co.)	78.7

The following thermal stations achieved a PLF of more than 75% during April, 1987 to February, 1988:

Ramagundam (NTPC)	77.7
Vijayawada (APSEB)	92.1
Trombay (Tata Electric Co.)	78.7
Singrauli (NTPC)	79.2
Tuticorin (TNEB)	76.5

RENOVATION AND MODERNISATION OF THERMAL POWER PLANTS

In 1984, Government had approved a Centrally sponsored scheme for the renovation and modernisation of thermal power stations at a cost of Rs.500 crores. The scheme extends to 34 selected stations and 162 generating units. Funds are advanced to the State Electricity Boards/Utilities in the form of loans to be repaid in 15 annual instalments with a moratorium of 5 years

SUPPLY OF COAL TO THERMAL STATIONS

There are 57 major coal based thermal power stations n the country. The quantity of coal received and consumed by these power stations during the year 1986-87 was 81 million tonnes and about 80 million tonnes respec It is estimated that during the year 1987-88 thermal st will consume about 93.80 million tonnes of coal. On ac of the increase in thermal generation, the average cons tion of coal has increased from 7.1 million tonnes per r during April-July, 1987 to 8.1 million tonnes per n during September-December, 1987. The number of wagons loaded by the Railways for the power sector increased from 7,307 wagons per day in April, 1987 to wagons per day in January, 1988.

ADDITION TO GENERATING CAPACITY

During the year 1987-88, an additional generating ca ity of 4,801.45 MW has been programmed for induc

Thermal	3,682.00 MW
Hydro	1,119.45 MW
Nuclear	Nil

By the first week of March, 1988 new generating ca ity aggregating to 3,060 MW was commissioned. By end of the current financial year a total capacity of al 4,500 MW is expected to be commissioned. This will c stitute the highest capacity induction in a single year. the three units of a capacity of 115 MW each of the S Hydroelectric Project in Jammu & Kashmir, were c missioned in November, 1987.

TRANSMISSION

The construction of transmission projects continues to accorded a high priority in the context of evacuation power from the Central generating stations to the benef iary States. The programme for 1987-88 includes constr tion of 2,694 circuit kilometers (Ckt. Kms.) of 400 KV lin and 2,730 Ckt. Kms of 220 KV lines, alongwith the asso iated sub-stations.

The progress achieved upto 29.2.88 in construction transmission lines and sub-stations during the year is sur marised below:

400 KV : 1,323 Ckt. Kms.
220 KV : 1,420 Ckt. Kms.
400 KV sub-stations : 6 Nos. (1,685 MVA)
220 KV sub-stations : 21 Nos. (2,010 MVA)

It is estimated that by the end of March, 1988 cons tion of additional 495 ckt. km of 400 KV lines would completed. Stringing of about [illegible] ckt. kms. would

n three 400 KV lines. In regard to 220 KV lines,
ted that construction of 2,358 ckt. km would be
by the end of the year. As regards substations,
ted that additional 315 MVA capacity at 400 KV
MVA capacity at 220 KV substations would be
by the end of the year.

MISSION & DISTRIBUTION LOSSES

erage all-India transmission and distribution loss
ear 1986-87 has been estimated at about 21.5%.

Government of India have launched a scheme for
payments to the State Electricity Boards/Electric-
rtments, for the reduction of transmission and dis-
(T&D) losses, Under the scheme, the SEBs/
ity Departments and their Distribution Divisions
chieve a prescribed minimum reduction in T&D
would be given cash awards. Individuals as well as
ons and organisations which develop a scientific
or put forward practical suggestions for the reduc-
T&D losses, would also qualify for cash awards.

RATED OPERATION

Regional Power Grids in the Northern, Western,
rn, Eastern and North-Eastern Regions facilitate
egional exchanges of power, supply of power from
to deficit areas, and assist in the optimum utilisa-
the power available in the country.

LOPMENT OF NATIONAL POWER GRID

setting up of a National Power Grid is an evolution-
cess. To achieve this objective, the strengthening and
vement of the Regional Power Grids and their pro-
ve integration through the setting up of inter-State
ission lines and Central Sector transmission projects
cut across State boundaries were continued during
ar. These projects alongwith the 400 KV and 220 KV
ssion systems being constructed by the National
al Power Corporation, the National Hydroelectric
r Corporation, the Neyveli Lignite Corporation and
rth-Eastern Electric Power Corporation are expected
stitute the basic structure of the National Power Grid.

AL ELECTRIFICATION

e Rural Electrification schemes are financed by the
Governments as well as the Rural Electrification Cor-
ion. At the end of the Sixth Five Year Plan, 3.70 lakh
es on the basis of 1971 census had been electrified
and about 57 lakh pumpsets energised, representing 64.2% of the total villages and 47.5% of the total potential for pumpsets in the country.

The targets for village electrification and energisation of pumpsets for 1987-88 are 21,377 villages and 398,120 pumpsets. Upto January 1988, 11,428 villages were electrified and 389,625 pumpsets energised.

The electrification of Tribal villages and Harijan Bastis continued to receive special attention. Out of a total of 1.10 lakh tribal villages, 50,593 had been electrified upto September, 1987. The number of villages in which street lighting facility has been extended to Harijan Bastis was 188,593 as on 30.9.1987.

II. NUCLEAR

GENERAL SURVEY

The year marked the completion of four decades of the formation of the Atomic Energy Commission (AEC) as apex policy making body of the Government of India, for development and utilization of nuclear energy for peaceful purposes. Over the years, the country has carved a niche as a nation that is self-reliant in nuclear technology and has the ability to operate the entire nuclear fuel cycle -- from exploration of uranium to reprocessing of spent fuel, as well as recycling of plutonium.

Conversion of the Nuclear Power Board into the Nuclear Power Corporation of India Limited (NPC) was an important development during the year. The Corporation has been formed to manage nuclear power generation along modern commercial lines and involve public in its financing.

About 13% increase in nuclear power generation over the previous year, rehabilitation of RAPS-I, the research reactor Dhruva achieving 100 MW (Thermal) power level and setting up of the labelled biomolecule laboratory "Jonaki" at Hyderabad (Andhra Pradesh), are some of the other notable highlights.

Nuclear Power

To implement nuclear power generation programme of the country on commerical lines, the Nuclear Power Board was converted to the Nuclear Power Corporation of India Limited (NPC). The Corporation was formally inaugurated by the Chairman, AEC on October 16, 1987. The target of generating 10,000 MWe of nuclear power by 2000 AD will need an expenditure of Rs.10,000 crores. To meet the financial requirement of new projects under construction, the Corporation had gone for public borrowings to the tune of Rs. 100 crores. These bonds were oversubscribed by Rs. 41 crores. The Government has decided to retain RAPS-I as a non-commercial Government owned unit which NPC will manage as an agent of the Government. Fuel and heavy water will be property of the Government and will be leased to the Corporation.

Tarapur Atomic Power Station

TAPS logged 36 reactor years of operating experience. TAPS-II attained the record run of 204 days and generated 1,269 million units.

Unit-1 was resynchronised in November 1987, following the tenth refuelling outage. This outage was originally planned for a period of six months to carry out inspection of the reactor vessel primary nozzles and install new feed water spargers. The plant designers (M/s. General Electric of U.S.A.) had recommended such an inspection due to generic problems encountered in other boiling water reactors. There was a time when engaging the services of some foreign firms to do this work was considered, but it would have cost a large sum in foreign exchange and probably would have also taken about a similar duration of outage. This extremely difficult work in a high radiation zone has been carried out using indigenous inputs of personnel, ideas and equipment. The investigations carried out on Unit-1 have indicated that similar work planned to be carried out on Unit-2 may not now be necessary.

Unit-2 has been operating steadily and has exceeded its generation target for the period.

Work on augmentation of the spent fuel storage facility at Tarapur continued.

Rajasthan Atomic Power Station

RAPS-I after rehabilitation, was synchronised to the grid on May 22, 1987 and generated 224 million units. The reactor had uninterrupted operation of 60 days during October to December, 1987 and was shut down due to a grid fault on December 9, 1987.

RAPS-II gave good performance by achieving higher than targeted power generation at 1,246 million units and the capacity and availability factors of [illegible] and [illegible] respectively.

There was a planned outage of the reactor in S 1987. It was synchronised with the grid on 7 N 1987 and since then has been operating satisfa

Madras Atomic Power Station

During the year, MAPS-I generated 1,230 mi against a target of 1,288 million units and achieve ity factor of 60%. The reactor also recorded a c run of 70 days during August to October 1987 an improvement over the previous year.

MAPS-II also gave similar performance. It g 1,217 million units and achieved capacity factor

There was a totally unexpected failure of turb in both the turbo generators (of MAPS-1 and 2) by M/s. BHEL. Cracks were noticed at the root o bine blades in high pressure stages while three brok were noticed on the low pressure stages of Unit-2. adversely affected the operation of both the un ever, quick rectification was carried out by divert ponents from turbines of Narora and Kakrapar to ret the two units of MAPS. This is one of the benefits dardised designs and components in a number o

Narora Atomic Power Project

The first unit of NAPP is expected to attain cr in October 1988. More than 62% of piping work II has been completed and the first steam generator installed. NAPP-II is expected to attain criticality b ber, 1989. The project has been delayed mainly du late delivery of steam generators.

Kakrapar Atomic Power Project

Construction of plant buildings is in progress. Ca and end shields of both the units have been deliver shield and Calandria for KAPP-I have been in KAPP-I and II are scheduled to attain critica December 1990 and December 1991 respectively

Kaiga Atomic Power Project

Financial sanction for two units of 235 MWe ea been accorded and infrastructural development wo progress. Advance action has been taken and orders delivery equipment and their manufacture is in pr Kaiga units are scheduled to attain criticality by Jun and December, 1995 respectively.

:NEWABLE SOURCES OF ENERGY

A. Biogas

L PROJECT ON BIOGAS 'MENT (NPBD)

consisting mostly of methane gas is a clean fuel and is produced through an-aerobic diges- nic materials, like cattle dung, agro-wastes, water The digested slurry is an excellent organic manure the Biogas technology helps in generating eco- efits in terms of savings of fire wood as well as fertilizers, besides social benefits like removing of women and children in collection of fuel, elim- eye and lung diseases caused due to smoke, saving g time and improvement in sanitation and envi- The Biogas programme is gaining acceptance in s.

7.4 lakh biogas units were installed during the 81-82 to 1986-87. Out of this, over 2.0 lakh units alled in 1986-87 alone, against the target of 1.5 . The achievement was thus 33.7% more than the total sum of Rs. 64.55 crores was released to state ents and other implementing agencies under the

ment and Target

ificantly scaled down target of 1,20,900 biogas s set for 1987-88 in view of the curtailed outlay 2.00 crores for the year. The target was assigned ent states and implementing agencies. Phasing of nent was done quarter-wise for monitoring purpo- 15% for the first quarter, 10% for the second quar- for the third quarter, 60% for the last quarter of . Over 70,000 plants were set up by 31st December, gainst the target of 48,360 plants for the period ecember, 1987. The achievement, therefore, is 40% an the target. Statewise details of achievements are the table on page 174. It is expected that the target ,900 plants will be exceeded.

s

9 lakh biogas plants have been set up in the coun- e 1974-75 (out of which about 8 lakh plants were d under NPBD). Assuming that about 85% of these re in working order at a given time and the average of the plants is to generate four cubic metres gas per day for 300 days in a year, these plants are expected to produce 918 million cubic metres of gas per annum, equivalent to 31.8 lakh tonnes of firewood valued at Rs.127.3 crores. In addition, these plants produce 153 lakh tonnes of enriched manure per year containing about 3.06 lakh tonnes of NPK valued at Rs.126.7 crores. Thus biogas plants generate substantial economic gains to the nation in addition to many social benefits.

Monitoring & Evaluation:

Monitoring Cells have started functioning under the aegis of DNES at Jaipur, Chandigarh and Delhi. Action for creation of more monitoring cells is in progress. These cells are conducting field inspection and monitoring of the programme in the states.

Further efforts have been made to inspect 100% plants in selected districts in each state. Inspection has already been completed in the districts of Gurgaon and Karnal in Haryana, Madhepura in Bihar, Guntur in Andhra Pradesh and Union Territory of Delhi. Reports received from these cells are being used for review and evaluation during discussion with the concerned states. In addition eight independent organisations such as Indian Institute of Management, Ahmedabad; Centre for Studies in Decentralised Industries Bombay; Agricultural Finance Corporation, Lucknow; National Council of Applied Economic Research, New Delhi; West Bengal Consultancy Organisation Limited, Calcutta; Besant Raj Consultants Limited, Madras; etc. were engaged to conduct survey and evaluation of family type biogas plants set up during the years 1984-85 and 1985-86.

COMMUNITY/INSTITUTIONAL BIO GAS DEMONSTRATION PROGRAMME

Community/Institutional Biogas Plants Demonstration Programme is an integrated decentralised waste re-cycling and energy generation programme for providing clean and hygienic cooking gas, drinking water and electricity to the people living in the villages. Initially DNES was funding 100% of the capital cost of CBPs and 75% of the cost of IBPs, but with a view to provide the benefit to more and more villagers and involving them in installation and regular operation of the plants, DNES has reduced the subsidy to 90% and 70% in respect of CBPs and IBPs respectively. The remaining 10% and 30% respectively of the project cost is to be met by the beneficiaries.

The biogas generated by these plants is used primarily for cooking. However, surplus gas can be used for running biogas engines. During the recent drought conditions, the nodal agencies have also been directed to utilise the ma

National Project of Biogas Development Achievement Vis-a-Vis Target for 1987-88 April-December 1987)

(No. of Plants)

State/UTs	Target Annual	For the period under report	Achievement cummulative
Andhra Pradesh	10,000	4,000	3,824
Arunachal Pradesh	5	2	--
Assam	2,000	800	739*
Bihar	5,000	2,000	2,186
Goa, Daman & Diu	100	40	61
Gujarat	7,500	3,000	6,365
Haryana	2,000	800	704
Himachal Pradesh	3,000	1,200	2,194
Jammu & Kashmir	100	40	74
Karnataka	5,000	2,000	1,838*
Kerala	2,500	1,000	898
Madhya Pradesh	2,000	800	1,360
Maharashtra	30,000	12,000	19,439
Manipur	15	6	Nil
Meghalaya	50	20	--
Mizoram	60	24	44
Nagaland	10	4	--
Orissa	3,000	1,200	1,988
Punjab	1,300	520	844
Rajasthan	3,000	1,200	2,040
Sikkim	30	12	19*
Tamil Nadu	13,000	5,200	7,647
Tripura	10	4	--
Uttar Pradesh	18,000	7,200	7,680
West Bengal	3,000	1,200	2,457
Andaman & Nicobar	5	2	14*
Chandigarh	5	2	2
Dadra & Nagar Haveli	10	4	4*
Delhi	100	40	6*
Pondicherry	100	40	13
Sub Total (A)	*1,10,900*	*44,360*	*62,440*
KVIC	10,000	4,000	7,799
Sub Total (B)	10,000	4,000	7,799
Grand Total	*1,20,900*	*48,360*	*70,239*

* *Reports for the month of December 1987 is still awaited.*

imum potential of the gas generation for water extracti for drinking and irrigation purpose. For this purpose, DNE have also contributed towards the cost of the bore wel engines and pumps etc. in the same proportion as for t capital cost of the plants.

Apart from the use of cattle dung as feed material, othe mixed feed materials like night soil, agricultural residue and water hyacinth etc., are also being gradually accepte for biogas generation. Six large size biogas plants linke with Sulabh Sauchalayas have been commissioned during the year in Bihar. The biogas from the plants is utilised fo electricity generation for street lighting. DNES hav launched a large scale programme for biogas generatio from nightsoil at potential sites in cities, by linking community toilets with the gas generation system.

The States of Delhi, Andhra Pradesh, Gujarat, Madhya Pradesh, Punjab, Rajasthan, Uttar Pradesh and Maharashtra have taken lead into the expansion of the programme and installing a number of such projects in different villages. The Planning Commission have also expressed their satisfaction on the utility of the programme and suggested its enlargement specially in respect of the CBPs which give direct benefit to the villagers, and is in the consonance with national priorities.

All the IBPs constructed so far under the programme are working satisfactorily with the active efforts of the management of the beneficiary institutions. Some of the institutions (in Gujarat, Rajasthan & U.P) having noticed considerable savings in terms of firewood due to the best and optimal utilisation of biogas and are interested to set up additional units of Biogas plant. 31 IBPs have been completed in the past 9 months during the year. These institutions are mainly educational organisations, religious ashrams, goshalas, defence units, registered societies, state & central cattle dairy farms etc. So far 148 organisations have built biogas plants under IBP scheme where gas is utilised by their farm and other workers. The programme has picked up in Tamil Nadu also, where four IBPs have been commissioned during the year. Two IBPs at St. Mary's Higher Secondary School and St. Francis Xavier Convent in Madurai district are successfully running since June, 1987. The gas is being used in their Community kitchens.

As regards CBPs, a total of 171 plants have so far been taken up throughout the country. The unit capacity of plants range from 45 Cum. to 140 Cum. biogas per day. At some of the sites 3-10 units have been built depending upon the availability of cattle dung and potential for utilising the gas. The gas is mainly used for the cooking purposes. How-

LATEST STATUS OF CBP/IBPs COMPLETED/COMMISSIONED

	Upto 31.3.1987			During 1987-88 upto 31.12.1987			Cummulative total upto 31.12.1987		
	CBP	IBP	Total	CBP	IBP	Total	CBP	IBP	Total
a Pradesh	21	24	45	1	4	5	22	28	50
	--	1	1				--	1	1
	6	--	6				6	--	6
	1	--	1				1	--	1
at	16	6	22	1	5	6	17	11	28
na	2	4	6	1	1	2	3	5	8
chal Pradesh	--	1	1				--	1	1
taka	2	--	2	--	1	1	2	1	3
a	--	2	2				--	2	2
ya Pradesh	17	17	34	--	2	2	17	19	36
rashtra	2	26	28	8	--	8	10	26	36
a	4	3	7	--	1	1	4	4	8
cherry	--	1	1				--	1	1
b	28	4	32	13	3	16	41	7	48
than	5	17	22				5	17	22
Nadu	2	2	4	--	6	6	2	8	10
Pradesh	32	16	48	--	8	8	32	24	56
Bengal	2	--	2				2	--	2
	140	**124**	**264**	**24**	**31**	**55**	**164**	**155**	**319**

the surplus gas available is being utilised for running fuel engines for water pumping, gensets for electric- neration, chaff cutting, flour milling etc., as per the of the villagers.

B. Solar Energy

OLAR THERMAL ENERGY

EARCH, DEVELOPMENT & IONSTRATION PROGRAMME

rly fifty research and development projects are cur- under progress in various research institutions such tional Laboratories, IITs, Universities, etc. under the rship of the Department. The research projects are r on the development of new solar thermal technol- or development of new materials to reduce the cost e already developed technologies.

velopment of solar air-conditioning/solar refrigeration, thermal power generation, energy storage, solar pas- architecture and solar collectors for medium and high erature applications have been identified as thrust areas search and development.

Aqua-ammonia solar absorption chillers developed under the R&D programme of the Department of various research institutions are currently under field tests. A 30-ton solar absorption refrigeration plant operating at Deoria in Uttar Pradesh, another plant of 10-ton capacity in Baroda, are working satisfactorily. Solar Energy Centre in collaboration with Sardar Patel Renewable Energy Research Institute has been given the task of development of zeolite solar refrigeration systems.

Under DANIDA projects three solar milk chilling plants of capacity 5000 lpd, 400 lpd and 200 lpd respectively are being installed at Bilaspur in Haryana, Wardha in Maharashtra and Bharatpur in Rajasthan. Ten numbers of solar ice-pack freezers are also being installed at ten health centres to study their suitability for preserving life saving drugs and other medicines. If the experiments are successful these technologies may help in bringing white revolution and also providing better health facilities in the rural areas.

In the areas of solar thermal power generation both line focus and point focus technologies are being studied under the sponsored research programmes. A 22 KW solar thermal power plant using indigenously developed point focus collectors and steam turbine is in operation at Sal[illegible] lage in Andhra Pradesh. Another power plant of 50 KWe with line focussing collector and steam turbine is currently under installation at Gwal Pahari premises of Solar Energy Centre and is likely to be commissioned by March, 1988. Department has completed feasibility studies on setting up of 30 MW solar thermal power plants. Several State Governments have shown keen interest in such a programme and desired to install such solar thermal power plants in their States.

Under the Department's sponsored project, selectively coated tubular collectors have successfully been developed by IBP, Bombay and Poona University, Pune. Currently, efforts are on to develop the heat extraction mechanism using these collectors. These collectors may prove to be efficient and cost effective for medium temperature applications. Parabolic dish concentrators with as big as 9 metre diameter have been developed with fully automatic controls for the tracking. It is proposed to use these collectors in dish-stirling solar thermal power plants for generation of electricity.

Earlier, solar thermal pumps of capacities 500 watts and 1000 watts hydraulic capacity were developed under Indo-FRG joint research programme. Successful field trials of these pumps have shown their capability for drawing water from a depth of 40-50 metres. The Indo-FRG collaboration is being extended for improving upon the technology and also for study on setting up the pre-series manufacturing facility for these pumps.

Earlier, three passive houses were constructed for different climatic zones in the country. These are now being monitored. New research programmes on solar passive architecture have been sponsored to develop building codes for energy efficient houses for different climatic zones. Nearly 100 solar huts have been provided to army and police forces in the remote hilly areas of the country. Green houses have also been constructed for cultivation of fruits, flowers and vegetables in cold desert areas of Leh where vegetation is scarce.

A solar kier of capacity of 20 kg. has successfully been developed for processing of cloth in the textile industry. The capacity of the plant is being up-scaled to 100 kg. Once the 100 kg capacity solar kier is tried out successfully it may find its wider utilization in handloom sector of textile industry.

Solar thermal energy has successfully been used in the process for extracting alcohol from sugarcane. A pilot plant based on this technology is now in operation in Maharashtra.

Projects are also undergoing on the developmen
materials and systems for thermal energy storage. A nu
of chemical materials are being studied for their phy
and chemical properties for this purpose.

The fish drying technology has been recently develo
under one of the sponsored programme of DNES. It is
posed to upscale the technology under the demonstra
scheme. Similarly, dryers for drying of specific mate
such as grapes, silk cocoons, etc. are under developm

Solar water heaters using polypropylene collectors
EPDM collectors, made out of imported material are
operating in some parts of the country to deliver hot w
for low temperature requirement. These collectors are ch
compared to the conventional metallic collector being
for similar applications. With a view to develop indigen
plastic material for solar applications the department is fu
ing projects for the development of Tedlar films for
lector glazing and EPDM for use as absorber material.
possibility of using plastic mirrors for concentrating
lectors is also being explored.

Extension Programme

The extension programme for the use of low grade s
thermal devices by the user with investment sharing by
Government have been quite successful in creating
awareness and a sound industrial infrastructure for th
technologies. It is now proposed to reduce the percent
of investment sharing for different category of users in s
cessive financial years so that with the limited resou
at DNES more and more systems could be installed t
benefitting large number of users. Out of all the low g
solar thermal devices that are available to the users un
the Extension Programme, solar water heaters are in g
demand.

II. SOLAR PHOTOVOLTAICS

Solar photovoltaic technology enables the generation
electricity directly from sun light and is an important te
nique of solar energy utilisation. Photovoltaic power s
tems have several advantages such as modularity, ease
installation, low maintenance, noise and pollution-free o
ration, etc. They can be utilised to meet the electrical ene
requirement for a variety of applications. This technolo
is considered to have significant potential in India an
particularly suitable for application in remote and isola
areas and in villages which are not served by conventio
electricity grids.

t Heavy Electricals Limited have been given the
bility for installing and commissioning the amor-
ilicon pilot plant facilities which will be used for
technology development with inputs from R&D
and also for pilot production. Following a detailed
ion of offers received in respect of a public notice
supply of equipment for the pilot plant, an order was
with M/s. Glasstech Solar Inc., of U.S.A. The plant
based on a continuous deposition system with multi-
mbers. It will be designed to make amorphous sil-
hotovoltaic modules of 30 cm X 30 cm size with
lity of using larger size glass substrates also.

ailed plans and estimates for the pilot plant building
been drawn up and tenders issued. Civil works are
ted to be started shortly in the campus of the Solar
y Centre in Gurgaon district of Haryana. Training of
engineers has also commenced. The plant is sche-
to be commissioned in mid-1989.

search on other aspects of photovoltaic technology
as silicon materials, thin film devices based on com-
d semiconductor materials and photo-electro-chemical
was also supported during the year. Single crystal
rs made from indigenous polysilicon were evaluated
eputed manufacturers abroad and have given good
ts. A project aimed at reduction in energy consump-
nd cost of production of polysilicon has been approved
unding. Among the thin film devices being studied are
based on cadmium telluride, copper idmium disel-
e, etc.

tovoltaic Street Lighting Systems

is now recognised that even small amounts of electric
er can bring about significant improvements in the
al life and welfare of rural communities. Photovoltaic
er is considered to be a reliable and cost effective energy
rce for rural electrification, particularly in remote and
ated areas. The programme for initial electrification of
ges through provision of street lights was started in
-85. The programme was accelerated during 1987-88
account of requests from several electricity boards and
Rural Electrification Corporation. As a result, as many
5,255 street lighting systems have been supplied to var-
s organisations between April-December, 1987 compared
about 3,000 units in the corresponding period of 1986-87.
rther, at least 1,200 more units are likely to be supplied
ing the last quarter of 1987-88. On a cumulative basis,
out 2,000 villages are estimated to have benefited from
systems already supplied under the programme. Among
States which have received significant supplies during
the year are Andhra Pradesh, Himachal Pradesh, Uttar Pradesh, Rajasthan, Gujarat, Maharashtra, Orissa, West Bengal and Nagaland.

Community Lighting/TV Systems

Photovoltaic power packs can be used to power lighting systems and T.V. sets installed in community centres, schools, etc, in rural areas. 44 community lighting/T.V. sets were supplied during the year upto December, 1987 for installation in different locations in the country. Some of the T.V. systems are equipped with dish antennas which receives signals directly from a satellite. Among the States which are utilising such community systems are Madhya Pradesh, Uttar Pradesh, Maharashtra, Gujarat, Orissa and Kerala. Two community lighting systems were also supplied for use in Lakshadweep Island.

Water Pumping Systems

Solar photovoltaic water pumping systems can be used for both drinking water supply and for irrigating small farms. The system currently available consists of a 360 Wp PV array, a manual tracking structure and a matching DC pump set. On account of their high material costs, their use is at present somewhat restricted. DNES is implementing a modest programme of demonstration under which such pumps are being made available to institutional users and individual farmers at a subsidized price. 126 pumps were supplied between April-December, 1987.

The possibility of using photovoltaic power for providing lights in homes using stand-alone systems has been engaging the attention of DNES for sometime. Such systems are presently being tried out on an experimental basis in some States with support from DNES. About 100 tribal homes in Gujarat, Madhya Pradesh and Meghalaya have been provided with such units. Additional units have been supplied to Andhra Pradesh, Tamil Nadu and Andaman & Nicobar Islands. Such systems are also proposed to be tried out in colder climates such as in Ladakh and Himachal Pradesh.

Centralised Photovoltaic Systems

Centralised photovoltaic power systems in the range of 1-5 KWp can be of considerable use in India for meeting rural electrical energy requirements. Such power systems can serve street lights, domestic lights, community T.V, etc. During the year, such systems were commissioned in Goa, Uttar Pradesh, Mizoram, Tamil Nadu and Tripura. A 5 KWp system is under installation in Lakshadweep. Work is also in progress in few villages in Gujarat and on larger systems (21-25 KWp) in Orissa and Haryana. Additional projects are under consideration in Jammu & Kashmir and Uttar Pradesh.

Battery Charging Systems

Solar photovoltaic modules can be conveniently used for charging batteries used in vehicles and in communication equipment in police stations, border out-posts and other remote locations. Such systems have been supplied for use by the Border Security Force, Indo-Tibetan Border Police and in Maharashtra and Tripura.

Other Projects

Under a joint programme with the Railway Board, PV power systems are being installed at Tavargatti, Nagalavi and Sulehalli stations on the South Central Railway. Work on preparation of reports in respect of projects on the Northern, North Eastern and North East Frontier Railways was also taken up. A rural telephone exchange in Benakanahalli in Karnataka was provided with a PV power system and another similar system in Orissa is under completion. Proposal for the use of photovoltaic systems for microwave repeater stations in Rajasthan and Uttar pradesh are under consideration. Some additional TV transmitters (VLPTs) powered by PV systems supplied by CEL have been commissioned in remote areas such as Andaman and Nicobar Islands and Lakshadweep.

C. Wind Energy Programme

RESEARCH & DEVELOPMENT

Research & Development activities have continued on the development of new windpumps and improvements in the existing windpumps. Different designs/models of indigenously developed windpumps have been taken up for performance testing and evaluation in the field. Design, testing and adaptation of wind electric systems, particularly for battery charging, was also continued.

WIND PUMPING SYSTEMS

Performance monitoring of different types of windpumps was continued at the test field at NAL, Bangalore. Further indigenously developed and imported models are being installed at the test field for comparative performance studies. Several modifications/improvements in the existing 12-PU-500 wind pumps were carried out. Certain site-specific improvement and modifications have been found to increase reliability and improve the performance of windmills. Strict quality control in fabrication and erec has also been effected. Greater attention has been give the development and testing of hybrid and deep-well wi pumping systems. Under the field testing programme, windpumps, testing of Indoxy and BHEL windpumps continued. The following indigenously developed mod were also introduced for field testing:

i) L.G.B. X 12-PU-250 windpump
ii) DW 400 G windpump
iii) Samira windpump, using a 2 H.P. centrifugal pum
iv) New improved design of 12-PU-500 windpump, de loped in Gujarat

Several proven windpump systems popular abroad ha been identified, and three different types are being procu in small numbers this year for installation in varying agr climatic conditions in different states with a view towar evaluation and possible adaptation, as appropriate.

A Regional Wind Energy Test Station (RWETS) fo technology adaptation, performance evaluation, testing an training activities on regional basis for windpumps and sma wind battery chargers, has been set up at IERT, Allahaba In addition it is proposed to set up three more Region Wind Energy Test Stations in Eastern, Western and South ern regions. The following activities were taken up RWETS Allahabad, during the current year:

i) Development of second prototype of 500W wind batter charger, and preparation of detailed design drawings
ii) Design of Aeropump, a new version of the 12-Pu-50 windpump.
iii) Finalisation and printing of technical document o 12-PU-500 windpump.
iv) Preparation of a User's Guidebook on 12-PU-500 wind pump.
v) Establishment of documentation cell, and procuremen of test equipment.
vi) Testing, performance evaluation and adaptation of imported windpumps.

WIND ELECTRIC SYSTEMS

Performance monitoring and field testing of 10 units of horizontal axis and 5 units of vertical axis indigenousl developed small wind battery charger was continued durin the year. The project being implemented by BHEL involving indigenous system design and assembly of a horizonta axis 55 KW wind electric genrator, based on selecte bought-out components, with the remaining sub-systems signed and fabricated locally, made good progress e year. The system design was completed and fab- and assembly is in progress. A prototype will be l at the wind farm at Tuticorin by July, 1988 for nance monitoring and evaluation.

project document on the establishment of a UNDP-d Wind Energy Centre at NAL, Bangalore was final- association with a UNDP X PDF Mission fielded the year. A Memorandum of Understanding signed n CSIR and DNES on creation of the Wind Energy was formalised between Director General, CSIR and ary, DNES in December, 1987. The first meeting of licy Committee was held in January, 1988. The e, which became operational during the current year, rovide relevant technical inputs to the national wind y programme. The scope of operation of the Centre clude resource assessment, research, development and n (where appropriate), testing evaluation and certifi- of wind energy systems, promotion of power gen- n through windfarms or other means, etc. Realising ed to first grow a suitable infrastructure it is proposed e core programme for the WEC will entail creation pertise and development of facilities for research, opment and testing exclusively for wind energy, for a very definite need has been felt for sometime in untry. After making a beginning in this direction, the would also engage in resource assessment, planning romotion of power generation through windfarms as The following Thrust Areas are proposed for the next years:

-situ testing of windpumps to assess their performance and to certify their structural integrity.
n-situ testing of grid-connected and stand-alone wind enerators.
aboratory component testing and initial calibration studies.
valuation of procedures and standards for certification f wind machines.
evelopment of expertise and facilities for assessment f innovative design concepts to assist designers of wind machines in industry and elsewhere.
evelopment of structural design codes for systems ntegration to provide a useful tool for design of wind machines.

MONSTRATION AND FIELD TESTING

ith a view to obtain a larger user response, to create reness in newer areas, and to provide inputs for a sub-ent large scale extension programme, 500 wind pumps were taken up for installation under the demonstration programme during the current year. With the introduction of private beneficiaries, the programme has gained momentum and has led to more effective operation, maintenance and utilisation programme during the current year. As a result, the number of malfunctioning wind pumps has substantially decreased. Repair of defective wind mills, maintenance services and technical performance monitoring and evaluation, have also been strengthened during the current year. Wind pumps are gaining wider acceptability, particularly in Orissa, Andhra Pradesh and Tamil Nadu, as also increasingly in Bihar, Uttar Pradesh and Madhya Pradesh. 1,946 wind pumps have so far been installed in 23 States/-UTs under the demonstration programme, out of which 229 have been installed upto 31.1.1988 during the current year. Statewise break-up of wind pumps installed under the demonstration programme is given in the Table below. Periodic co-ordination meetings of State nodal agencies were held to review progress of installation.

Status of Windpump Demonstration Programme as on 31.1.1988

State/UT	31.3.87	31.3.88
Andhra Pradesh	231	235
A & N Island	14	14
Bihar	127	152
Chandigarh	4	4
Delhi	45	45
Goa	6	6
Gujarat	94	94
Haryana	30	30
Himachal Pradesh	9	9
Jammu & Kashmir	3	3
Karnataka	17	24
Kerala	4	4
Madhya Pradesh	164	164
Maharashtra	132	132
Nagaland	4	4
Orissa	208	269
Pondicherry	10	10
Punjab	77	77
Rajasthan	76	76
Tamil Nadu	193	325
Uttar Pradesh	252	252
West Bengal	15	15
Tripura	2	2
Total	**1717**	**1946**

Under the programme for drought-affected areas, 50 numbers of various models of well-proven and reliable mecha nical wind-based pumping systems for deep-well pumping are proposed to be imported for installation during the next financial year. Performance monitoring and evaluation of 50 numbers of the low cost Poghil-II wind mills installed in the Ramanathapuram district of Tamil Nadu, was continued.

The windpump demonstration programme has succeeded in creating some awareness of the technology and has indicated a potential for its widespread utilisation in different parts of the country. However, the application of wind pumping technology is being pursued more vigorously for different agro-climatic conditons, pumping heads and water requirements, with a view to achieve reliability and reach volumes feasible for commercialisation. Already several enterpreneurs and industries are getting attracted to this area. Several private sector manufacturers, for instance, in Madras, Coimbatore, Pune and in Uttar Pradesh, and the public sector company, BHEL, have taken up fabrication of windpumps. It is hoped to achieve commercialisation of windpumps by the end of the current plan period.

Five wind farm projects of aggregate capacity 4.29 MW have been operating successfully at Okha and Mandvi in Gujarat; Tuticorin in Tamil Nadu; Puri in Orissa; and, Deogarh in Maharashtra. Except for minor problems the projects have performed well. About 90 lakh units of electricity have been fed to the respective State grids, upto the end of January 1988. Monitoring and performance evaluation are underway. The four 550 KW projects at Okha, Deogarh, Puri and Tuticorin are being expanded to capacity of 1.1 MW each. These projects are all based on 55 KW units. A wind farm project of 1.35 MW based on 15 Numbers of 90 KW wind electric generators are under implementation at Kayattar in Tamil Nadu. The commissioning of the four expansion projects and the Kayattar project is expected to be completed by 31st March, 1988. Projects of 2.0 MW aggregate capacity have been taken up in the States of Andhra Pradesh, Karnataka, Madhya Pradesh and Goa, based on an average unit size of 100 KW. An experimental wind farm of 0.5 MW capacity is planned for Tuna in Gujarat based on higher capacity machines. A total wind farm capacity of 9.40 MW will get established by mid-1988 involving 138 machines. The demonstration wind farm programme is proposed to be expanded to cover WEGs of higher capacity; procurement action is under finalisation for WEGs in the unit size range of 150-200 KW. Their installation will, however, spill over to the next year.

One of the major objectives of the demonstration programme is to create conditions for demand for such machines to grow so that an indigenous industry could develop. Several foreign companies are entering into ag ments with well-known manufacturing companies in I for indigenous manufacture of wind electric genera which is expected to be realised within the Seventh period. During the year, an application for foreign co oration for the manufacture of 150 KW unit size wind e tric generators, was approved. While two more applica were submitted, agreements/MOUs for joint ventures w formalised by two more companies. A few other com nies are taking a keen interest in the technology and proposing to take up indigenous production of wind t bines. Several initiatives are being taken for accelerat the utilisation and indigenous manufacture of wind elec systems. The Import Policy which already permits du free import of WEGs was extended during the year to co import of components and accessories to accelerate in genous production. Other policy initiatives contempla include wheeling (or banking) and/or purchase of power the electricity boards. Interaction with bilateral/multilate funding mechanisms has been taken up as well as w financial institutions in the country, to mobilise additio resources for implementation of a larger wind power p gramme, which in turn could accelerate commercialisati and indigenisation activities.

50 wind battery charges of unit capacities from 300 to 4 KW were procured last year for demonstration/fi trials for various battery charging applications. The p gramme, being implemented through REC, Army/Air F ce/Paramilitary authorities, and State agencies made go progress during the year. Site selection was completed. wind battery charges have been commissioned in Ta Nadu (1), Madhya Pradesh (2), Himachal Pradesh (2), Ut Pradesh (2), Tripura (1), Goa (1), Maharashtra (1), Andh Pradesh (1), and Army establishment (1). Erection a commissioning of the remaining machines is expected be completed during the current year. The demand for wi battery chargers is picking up, particularly for Defen requirements, and in the north-eastern region and isla communities.

10 stand-alone wind electric generator systems of capa ity 10 KW and 25 KW were procured for demonstratio and field trials in remote inaccessible areas, not covered b the conventional electrical grid. The systems will b deployed in association with diesel and/or battery back-u to provide continuous power for rural electrification, a in Army establishments and isolated communities. Si selection has been completed and the equipment has reache the sites, located in Jammu & Kashmir, Himachal Prades Uttar Pradesh, West Bengal and Rajasthan. Installation a performance evaluation will be taken up next year. Tec

sultancy organisations have been involved with ojects for project planning, supervision, monitor- co-ordination.

tates/UTs are also being encouraged to take up addi- emonstration wind battery charging and wind elec- eration projects. A total capacity of 1.04 MW will lled by the end of the current year, based on 21 indi- machines.

orkshop on Wind Farm Planning, Erection, Com- ning, Operation and Maintenance of large Wind , co-sponsored by DNES, was hosted by M.P. Urja Nigam at Bhopal in September, 1987. The workshop tended by technical institutions, State nodal agencies, city boards and representatives of industry. It dis- various aspects of wind-farm project planning and mentation, and recommended that in view of the over- ential, a Programme for 1987-88 should be for Rs.7.00 s, compared to a provision of Rs.6.00 crores for 87.

. Hydrogen Energy Programme

e Hydrogen Energy has been identified as one of the rtant areas under the new and renewable energy pro- me of India. Hydrogen is a clean and versatile fuel. gas, it can easily be piped through long distances. At onsuming points, a variety of appliances like Internal bustion engines, fuel cells and furnaces etc. can use ogen. DNES has at present 10 on-going research pro- in various National Organisations of repute and Uni- ities on three important aspects (Production, Storage and sation) of hydrogen. Among the important projects are:

roduction of Hydrogen by photoelectrolysis of water sing Solar Energy.

roduction of Hydrogen by blue green algae and certain acterial species.

torage of Hydrogen through metal and non-metal ydrides.

ombustion properties of hydrogen with other gaseous uels.

roblems relating to utilisation of hydrogen as fuel i.e. evelopment of suitable engines and burners etc.

iquid Hydrogen production, storage and utilisation.

Efforts are underway to develop a multi institutional ional coordinated project covering all aspects of hydro- .

A Technical Advisory Committee on Hydrogen Energy constituted by the Department identifies thrust areas, recommends new projects for financial support, coordinates, monitors and reviews the progress of all funded projects.

Satisfactory progress has been reported (1987-88) on all the funded projects, the details of which are as under.

PRODUCTION

This year a project was initiated on photobiolysis which depends on the action of certain catalysts to produce hydrogen from water by the direct action of sunlight at ambient temperatures. The research Group at BHU is engaged in investigations of two important semiconducting materials namely Titanium oxide (TiO_2) (Water photoelectrolysis) and Tungsten diselenide (WSe_2) (HBr, Hi photoelectrolysis). Surface modifications are being investigated and it is expected that present, investigation would lead to the development of optimised TiO_2 with repsect to PEC as a new photoelectrode material for photoelectrolysis of water for hydrogen production. In case of Tungsten diselenide (WSe_2) various routes for enhancement of PEC efficiency are being explored. Electrolyte modification was found to be the most effective way. It is expected that the material Tungsten diselenide (WSe_2) would emerge as a new class of photoelectrode material for hydrogen production through photoelectrolysis. As regards the production of hydrogen by blue green algae, the project aims at identification of a type of algae which exhibits higher rates of hydrogen.

E. Ocean & Other Energy Programmes

OCEAN ENERGY

Ocean Thermal Energy (OTEC) is one of the important sources of energy from Ocean. The OTEC work on the principle of utilising the difference of sea water temperature at depth and at the surface. The surface Sea Water is used to vaporise a low boiling chemical which drives a turbo generator. The vaporised chemical is compressed by compressor and is condensed by using cold Sea Water from depth. Oceanographic studies by National Hydrographic Offfice, Dehradun on the eastern side of Lakshadweep Island suggest the possibility of establishment of shore based OTEC plant at the island with cold water pipeline running down the slope to a depth of 800 to 1000 M.

A special cell was set up at IIT, Madras in 1981 for the coordination of various OTEC related activities like material research, installation of OTEC plant at Lakshadweep Island, documentation centre for the Storage of information on OTEC technology, updating the knowledge on OTEC following the interaction with other research laboratories. The cell has carried out this objective satisfactorily. It has also interacted with the Argenue National Laboratory at Chicago and Sea Coast Test Facility laboratory at Hawaii. The work relating to preparation of detailed project report was assigned to M/s. Metallurgical & Engineering Consultative (India) Limited (MECON), Ranchi. They have submitted the feasibility of the project report of 1 MW OTEC plant which was examined by a group of experts and the members of High Power Committee on the Ocean Energy. The estimated capital cost for 1 MW Plant would be to the tune of Rs. 30 crores.

However, priority could not be given to this project under Zero Base budgeting. MECON was therefore, requested to examine the possibility of reducing the capital cost through a smaller capacity plant using on the shelf component, modular system of heat exchangers and reducing the parastic losses. MECON has resubmitted the proposal. Also owing to some urgent national requirement it has not been possible to earmark land for the OTEC Project at Kavaratti. Lakshadweep Administration has proposed to locate suitable site at Minicoy for the OTEC plant.

The Research & Development activities in the field of Materials technology applied to OTEC, heat exchanger development were continued in 1987-88. The Project on harnessing of energy from Sea waves sponsored Department to Calcutta Port Trust is in progress. The model of collection device and conversion device ha prepared. The same has been tested at Digha beac

GEOTHERMAL ENERGY

For effective utilisation of geothermal energy, a p on 5-KW Pilot Power Plant at Manikaran based on thermal energy was undertaken by G.S.I., Lucknow N.A.L., Bangalore. The pilot power plant operating closed loop Rankine turbopack system employin chloro-tri-fluoro-ethane (R113) as working fluid has completely designed and fabricated at National Aero ical Laboratory, Bangalore. This plant will harnes energy contained in hot water flowing from borewells d by Geological Survey of India in Manikaran geother field. The geothermal heat source simulation system i porating the thermic fluid heater had been integrated the power plant circuitry for trials, so that the entire kine System could be completely checked and e coupled to geothermal source at Manikaran. The plant successfully test-run at the full load of 5 KW under ulated conditions in September, 1987 at N.A.L. The en ance trials will continue for some months to check out teething problems. The power plant will be transporte Manikaran for installation, commissioning and handing to Himachal Pradesh State Electricity Board.

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ANNEXURE-I
SIGNIFICANT STATISTICS ABOUT COAL AND LIGNITE

tion	Units	1985-86	1986-87	1987-88 (Apr.-Dec.)
DUCTION				
KING COAL				
r Metallurgical purposes	Mil. tonnes	29.07	31.50	20.44
r non-metallurgical purposes	Mil. tonnes	6.57	8.10	7.28
L COKING COAL	*Mil. tonnes*	*35.64*	*39.60*	*27.72*
N-COKING COAL	Mil. tonnes	118.56	126.19	96.65
TAL COAL PRODUCTION	***Mil. tonnes***	***154.20***	***165.79***	***124.37***
gnite -- NLC	Mil. tonnes	7.13	8.52	7.01
– Gujarat	Mil. tonnes	0.92	1.08	0.58
AL	*Mil. tonnes*	*8.05*	*9.60*	*7.59*
ashed Coal	Mil. tonnes	10.92	10.89	8.18
ard Coke	Lac tonnes	5.74	5.84	3.77
oft Coke	Mil. tonnes	1.71	1.53	1.07
eco (NLC)	Lac tonnes	2.01	1.89	1.65
rea (NLC)	Lac Tonnes	1.28	1.28	0.85
ower General MW (gross) (NLC)	MW	3938	5111	4531.13
TPUT MANSHIFT				
Coal India Ltd.	Tonne	0.91	0.98	1.00
SCCL	Tonne	0.81	0.80	0.79
ESPATCHES				
Coking coal				
Metallurgical Coal	Mil. tonnes	25.48	24.11	18.10
Non-Metallurgical Coal	Mil. tonnes	8.98	11.91	9.78
TAL COKING	Mil. tonnes	34.46	36.02	27.89
Non Coking Coal	Mil. tonnes	116.58	122.65	95.73
TAL COAL	***Mil. tonnes***	***151.04***	***158.67***	***123.62***
XPORT	Mil. tonnes	0.22	0.16	0.11
THEAD STOCK				
Metallurgical Coking	Mil. tonnes	7.99	9.39	8.49
Non-Metallurgical	Mil. tonnes	1.32	1.72	1.59
TAL COKING COAL	Mil. tonnes	9.31	11.11	10.08
Non-Coking	Mil. tonnes	18.47	17.73	16.23
TAL COAL	*Mil. tonnes*	*27.78*	*28.84*	*26.31*

ANNEXURE-II
COAL PRODUCTION COMPANYWISE DURING THE LAST FOUR YEARS

(in Million Tonnes)

Company	Coal Production during 1984-85* Target	Actual	1985-86 Target	Actual	1986-87 Target	Actual	1987-88 (A Target
ECL	25.10	23.11	24.00	24.03	25.60	25.62	19.10
BCCL	24.50	21.84	23.00	21.08	24.00	24.01	17.29
CCL	37.50	39.00	23.85	24.13	25.00	25.14	18.11
NCL	**	**	11.80	11.61	13.40	13.60	10.99
WCL	43.15	46.05	17.51	18.17	19.00	19.34	14.39
SECL	**	**	32.54	34.25	35.50	36.15	27.05
NEC	0.75	0.81	0.80	0.84	1.00	0.91	0.60
Total CIL	131.00	130.81	133.50	134.11	143.50	144.77	107.53
SCCL	17.00	12.33	16.00	15.66	18.00	16.58	14.35
Captive Collieries	4.00	4.27	5.00	4.43	5.30	4.44	3.64
Grand Total	**152.00**	**147.41**	**154.50**	**154.20**	**166.80**	**165.79**	**125.52**

* **Terminal year of 6th Plan.**

** Note: NCL and SECL are new subsidiaries formed w.e.f. 1-1-1986 by reorganising CCL and WCL.

ANNEXURE-III
CONSUMER-WISE OFFTAKE OF COAL FROM COAL INDIA LTD., SINGARENI COLLIERIES LTD., CAPTIVE SOURCES OF STEEL PLANTS DVC DURING 1985-86, 1986-87 AND 1987-88 (APRIL-DEC.)

(millio

Name of Consumer	1985-86	1986-87	198 (April-
Power House:			
Raw Coal			
Middlings	72.86+	81.89+	67.
Loco	(2.22)	(2.01)	(1.2
Steel Plants and Cokeries (in terms of raw coking coal)	9.10	7.87	5.
Cement Plants	24.49	23.39	17.1
Fertilizer	7.90	8.54	6.
Soft Coke	3.98	4.43	2
Export	2.29	2.04	1
Brick kiln, Textile, Chemical, Paper and other industries	0.22	0.16	0
Colliery Consumption	30.13	30.35	23.
Total: Raw Coal	4.08	4.02	2.
Middlings	155.05+	**162.69+**	**127.**
	(2.22)	**(2.01)**	**(1.2**

ANNEXURE-IV

ANSPORT OF COAL AND COAL PRODUCTS BY RAIL, ROAD AND OTHER MEANS

(Excluding Coal used for Colliery Consumption)

BY RAIL

(in Million Tonnes)

	CIL			SCCL	TISCO/ IISCO	Total (CIL/SCCL TISCO/ IISCO)	Total Movement of Coal by Railways
	External	Internal	Total	External			
	85.77	4.57	90.34	10.30	3.14	103.78	111.68
	89.91	4.73	94.64	10.54	3.45	108.63	119.30
.)	68.96	3.51	72.47	9.05	2.65	84.17	93.18

BY ROAD

	CIL			SCCL	TISCO/ IISCO/ DVC	Total CIL+ SCCL (External + Internal)
	External	Internal	Total			
	23.50	13.49	36.99	2.94	N.A.	39.93
	24.37	13.03	37.40	3.26	N.A.	40.66
.)	17.80	9.78	27.58	2.03	N.A.	29.61

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Centrifuges (all types)
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ANNEXURE-V
PRODUCTION OF CRUDE OIL AND NATURAL GAS

Company	1970-71	1975-76	1980-81	1985-86	1986-87	1987 (Apri
						('000 to
1. Crude Oil Production						
(a) Onshore						
AOC	104	66	48			
OIL	3084	3103	1243	2654	2623	
ONGC	3634	5279	4231	6691	7243	
TOTAL	*6822*	*8448*	*5522*	*9345*	*9864*	
of which:						
Gujarat	3455	4148	3808	4319	4563	
Assam	3367	4300	1712	4966	5239	
Arunachal Pradesh	--	--	2	60	57	
Tamil Nadu	--	--	--	--	5	
(b) Offshore						
ONGC	--	--	4985	20823	20617	14
GRAND TOTAL (a+b)	*6822*	*8448*	*10507*	*30168*	*30481*	*22*
						(Million Cubic Mete
2. Natural Gas Production (Gross)						
(a) Onshore						
AOC@	65	40	38			
OIL	905	1405	710	1553	1631	11
ONGC	475	923	937	1401	1517	11
TOTAL	*1445*	*2368*	*1685*	*2954*	*3148*	*23*
of which:						
Assam	980	1595	843	2029	2142	16
Gujarat	465	773	842	919	971	7
Arunachal Pradesh	--	--	--	6	13	
Tripura	--	--	--	--	22	
(b) Offshore						
ONGC	--	--	673	5180	6705	59
GRAND TOTAL (a+b)	*1445*	*2368*	*2358*	*8134*	*9853*	*83*

* Provisional

@ Exploration and production activities of AOC were merged with OIL w.e.f. 14.10.1981.

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ANNEXURE-VI
REFINERY CRUDE THROUGHPUT

('000 Tonnes)

	1970-71	1975-76	1980-81	1985-86	1986-87	1987-88* (Apri-Dec.)
wahati	686	827	639	766	802	615
rauni	2191	2949	504	2766	2860	1983
ijarat	3463	4107	6974	7830	7830	6306
ldia	--	1348	2308	2822	2623	2105
athura	--	--	--	6075	6353	4754
gboi/AOC[1]	476	527	503	529	551	411
Bombay/BSR[2]	3541	3630	4901	6389	5580	4898
Bombay/ESRC[3]	2367	2830	3113	4375	5011	4195
Vizag/CORIL[4]	1175	1081	1319	2659	3715	2634
ochin	2498	2294	2912	2749	4166	2965
Madras	1982	2690	2611	5057	5192	3641
Assam	--	--	52	893	1011	802
rude Throughput	**18379**	**22283**	**25836**	**42910**	**45698**	**35309**

onal

Refinery was taken over by the Government in October 1981 and merged with IOC.

vas taken over by the Government in January 1976 and renamed as Bharat Petroleum Corporation Ltd.

was taken over by the Government in March 1974 and renamed as Hindustan Petroleum Corporation Ltd.

L was taken over by Government in December 1976 and merged with HPCL on 9th March, 1978.

ANNEXURE-VII
REFINERY PRODUCTION

('000 Tonnes)

cts	1970-71	1975-76	1980-81	1985-86	1986-87	1987-88* (Apr.-Dec.)
	(a) FROM CRUDE OIL					
Production	*17110*	*20829*	*24123*	*39881*	*42761*	*33004*
t Distillates	*3021*	*3630*	*4101*	*8253*	*9069*	*6849*
ch						
i	169	331	366	867	995	734
as	1526	1275	1519	2306	2515	2111
htha	1205	1910	2115	4955	5437	4039
dle Distillates	*8562*	*10769*	*12115*	*21613*	*23324*	*17997*
ch						
osene	2896	2439	2396	4030	4912	3790
F	710	925	1001	1519	1553	1235
D	3840	6285	7371	14624	15450	11917
O	986	946	1108	1177	1172	892
avy Ends	*5527*	*6430*	*7907*	*10015*	*10368*	*8158*
ich						
).	2987	3595	4041	3791	3864	3643
l Oils (Total)	4090	5083	6120	7955	8011	6520
e Oils	231	342	426	501	491	358
umen	805	697	1082	1107	1325	957
roleum Coke	151	160	86	192	264	186
	(b) FROM NATURAL GAS					
G	--	--	--	363	494	381

isional.

ANNEXURE-VIII
CONSUMPTION OF PETROLEUM PRODUCTS

('000 To

Products	1970-71	1975-76	1980-81	1985-86	1986-87	1987- (Apr.-D
Total (Excl. RBF)	*17912*	*22447*	*30896*	*40872*	*43662*	*33*
1. Light Distillates of which	*2697*	*3596*	*4388*	*6776*	*7412*	*5*
LPG	176	336	404	1241	1497	1
Mogas	1453	1275	1522	2275	2505	2
Naphtha	904	1836	2325	3106	3249	1
2. Middle Distillates of which	*9040*	*11563*	*17056*	*23948*	*25656*	*20*
Kerosene	3283	3104	4228	6229	6645	5
ATF/Jet A-1	689	897	1125	1453	1603	1
HSD	3837	6595	10345	14886	16009	12
LDO	1092	878	1122	1123	1156	
3. Heavy Ends of which	*6175*	*7198*	*9452*	*10148*	*10594*	*7*
F.O.	3513	4279	5406	3806	3793	2
Fuel Oils (Total)	4664	5781	7473	7900	8047	5
Lube/Greases	545	441	593	700	755	
Bitumen	777	690	1064	1126	1309	
Petroleum Coke	107	151	137	163	208	
Others	82	135	185	259	275	

* Provisional.

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ANNEXURE-IX
IMPORTS/EXPORTS OF CRUDEOIL & PETROLEUM PRODUCTS

(Qty: '000 tonnes; Value Rs. Cror

Products	1982-83		1983-84		1984-85		1985-86		1986-87		1987-88* (Apr.-Dec.)	
	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Valu
GROSS IMPORTS												
A. Crude Oil	16949	4043.74	15967	3541.05	13642	3430.34	15144	3686.80	15476	2120.19	13350	2306.6
B. POL												
Products**	5028	1553.94	4328	1270.75	6092	1914.91	3865	1273.60	3048	652.70	2906	714.7
of which												
Naphtha	101	29.89	129	37.34	338	99.42	--	--	34	5.73	--	-
ATF	244	76.77	169	50.63	128	44.47	150	45.84	108	18.08	13	3.4
SK/DPK	1881	595.89	2030	603.64	2611	844.77	2568	844.41	1900	383.78	1702	400.3
HSDO	2582	756.91	1806	489.85	2573	763.56	890	257.02	750	148.43	92	212.2
LDO	19	6.11	42	10.80	--	--	--	--	--	--	--	-
Furnace Oil	--	--	--	--	175	39.02	20	4.39	--	--	--	-
Lubes	105	51.05	97	54.98	135	76.00	195	105.10	219	80.65	140	54.5
Others	96	37.33	55	23.51	132	47.67	42	16.84	37	16.03	109	44.0
Grand Total (A+B)	*21977*	*5597.68*	*20295*	*4811.80*	*19734*	*5345.25*	*19009*	*4960.40*	*18524*	*2772.89*	*16256*	*3021.39*
EXPORTS												
A. Crude Oil@	4552	1063.37	5522	1231.10	64.78	1563.16	528	135.15	--	--	--	--
B. POL												
Products@@	795	133.78	1472	356.96	933	255.03	1963	509.58	2491	411.23	2722	524.79
of which												
Naphtha	96	24.81	901	237.64	612	167.48	1796	448.52	2220	347.07	2032	415.00
FO/LSHS	677	103.20	440	74.03	170	33.75	14	3.81	99	11.68	552	73.75
Others	22	5.77	131	45.29	151	53.80	153	57.25	172	52.48	138	36.04
Grand Total (A+B)	*5347*	*1197.15*	*6994*	*1588.06*	*7411*	*1818.19*	*2491*	*644.73*	*2491*	*411.23*	*2722*	*524.79*
NET IMPORTS												
A. Crude Oil	12397	2980.37	10445	2309.95	7164	1867.18	14616	3551.65	15576	2120.19	13350	2306.69
B. POL Products	4233	1420.16	2856	913.79	5159	1659.88	1902	764.02	557	241.47	184	189.91
Grand Total	*16630*	*4400.53*	*13301*	*3223.74*	*12323*	*3527.06*	*16518*	*4315.67*	*16033*	*2361.66*	*13534*	*2496.60*

* - Provisional.

** - Includes product imports under BH Crude Processing arrangements at foreign refineries.

@ - Includes BH Crude consigned for processing abroad.

@@ - Includes supplies of POL products to Nepal made from 1983-84 onwards.

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spaces for more and more
people in the decades ahead.

Come the turn of the century and India will have nearly one billion and the world more than six billion people to support, according to a recent UN report.

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HOC has already started manufacturing **Phenol** and **Acetone** in plenty at Ambalamugal, Cochin (Kerala) to cater to this coming boom in pesticides, pharmaceuticals, laminates, moulding powders and paints in the decades ahead.

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HOC—Pioneering progress through chemical

JYESHTA HO

EVIEW OF PUBLIC SECTOR ENTERPRISE

As one of the few profit-making public sector units, Hindustan Organic Chemicals Limited, is playing a pivotal role in the country's chemical industry. The basic policy of the company is that the availability of its products should always be ahead of the total demand in the country. With this in view, of late, HOC has been expanding its production programmes to various fields. The author, Chairman & Managing Director of HOC narrates here the success story of the giant public sector unit.

Hindustan Organic Chemicals Limited: Achievements and Prospects

H. KRISHNAMURTHY
Chairman & Managing Director, Hindustan Organic Chemicals Ltd. Bombay.

NTRODUCTION

In the early fifties, the Government of India felt the need or indigenous manufacture of certain vital organic chem- cals and intermediates for Dyestuffs, Drugs, Rubber Chem- cals and in 1955 the possibility of such project was finally iscussed and planned for implementation. Accordingly Hindustan Organic Chemicals Limited, a Government of ndia Enterprise was incorporated under the Ministry of Chemicals & Fertilizers on 12th December, 1960 at Rasayni.

The site selected for HOC's chemical complex was a ecluded, barren area in Raigad District about 70 kms away rom Bombay.

In 1962, work on levelling of the site commenced. In this rea where there was no transport, no electricity, no potble water and none of the many comforts of today, man nd machine joined hands in converting a dream into reality.

No one would have dreamt that within two decades this ural backward area would find a prominent place on the ndustrial map of our country.

HOC started its operations in 1970 and during the period 970 to 1974 twelve plants were commissioned. These 12 lants produce a wide range of products which include, Nitrobenzene, Mono/Dichlorobenzene, Para, Ortho and Meta-Nitrochlorobenzenes, Para, Ortho and Meta Nitrotoluenes, Aniline, Acetanilide, Meta Amino Phenol, Formaldehyde, Di-nitrobenzene and Sulphuric Acid. These products serve a wide spectrum of industries comprising dyestuffs, rubber chemicals, drugs & pharmaceuticals, pesticides and laminates as also the strategic areas of defence and space research. HOC products also find use in detergents, cosmetics and perfumery industries. Thus it will be seen that HOC's products are vital for the manufacture of a number of essential goods ranging from life saving drugs through rubber chemicals and pesticides to laminates and perfumery.

EXPANSION AND DIVERSIFICATION

The 12 plants mentioned above which were established in the period between 1970 to 1974 were stablilised and production maximised in all these plants upto 1979-80. HOC believes in the basic philosophy that the availability of its products should always be ahead of the total demand in the country. At no stage there should be a situation of shortage of HOC products. With this basic philosophy a number of expansion and diversification schemes have been launched. Some of the highlights of these schemes are as follows:

- In addition to the earlier Aniline, Nitrobenzene and Hydrogen plants, a second set of Aniline, Nitrobenzene and Hydrogen plants were established. It would be interesting to note that for these second Nitrobenzene and Aniline plants the company provided its own process package.
- The capacity of the Nitrotoluene plant was expanded from approximately 3,100 tonnes per annum to 6,200 tonnes per annum.
- The capacity of the Nitro-chlorobenzene plant has been tripled from a level of 3,000 tonnes per annum to 9,000 tonnes per annum.

- A new Concentrated Nitric Acid Plant of capacity of 50 tonnes per day has been established so as to reduce the reliance of HOC on Rashtriya Chemicals & Fertilizers, the only manufacturer of CNA at that time in the country.
- A new plant for the simultaneous manufacture of Acetic Acid and Acetic Anhydride from Acetaldehyde was also set up. The capacity of this plant will be 1,330 tonnes per annum of Acetic Acid and 2,000 tonnes per annum of Acetic Anhydride.

A NEW UNIT AT COCHIN

Another significant development is the launching of a major chemical complex at Ambalamugal near Cochin for the production of 40,000 tonnes per annum of Phenol and 24,600 tonnes per annum of Acetone at an approximate cost of Rs.83.5 crores. Phenol is a broad spectrum chemical required in the manufacture of phenolic resins, dyes, pesticides and drugs. At Cochin, based upon Phenol and Acetone a wide range of chemicals comprising resins like Phenol-Formaldehyde, fungicides like Penta-chlorophenol, new engineering plastics like Polycarbonate and a wide variety of other chemicals like Nonylphenol, Dodecylphenol, Bisphenol-A etc. can be manufactured. Thus this chemical complex will open up new vistas for industrial growth in the State of Kerala.

CHEMICALS TO ENGINEERING PLASTICS

Besides Phenol, HOC was looking critically at the different options it had for further growth. After careful thinking, it was decided that we should pioneer the era of engineering plastics in our country.

Among the various engineering plastics, it was decided to start with Polytetrafluoroethylene (PTFE). Since Andhra Pradesh Industrial Development Corporation (APIDC) invited HOC to put a unit in Andhra Pradesh it was also decided that this unit to produce PTFE should be in Andhra Pradesh.

At the same time HOC also thought that the Public Sector Enterprise should associate the public in its activities especially by way of investment in the equity shares. It was decided that a new company "Hindustan Fluorocarbons Limited" (HFL) would be floated in which HOC would have 51% equity, APIDC 11% and the remaining 38% would be issued to the public. HFL was formally incorporated on 14th July, 1983. The 500 tonnes per annum PTFE plant of HFL is located at Rudraram, 44 kms away from Hyderabad on the Hyderabad-Bombay highway. The site was chosen taking into consideration the availa water, power and also the need for developing b areas. Rudraram is situated in the backward d Medak in Andhra Pradesh.

As mentioned earlier the equity portion comes fr APIDC and the public. The public issue of the equ of HFL was made in February 1987 and the respo the public was overwhelming. HFL has been all the Government of India to retain the over subscrip 25% of the original issue. Thus the equity share of t in this project will be approximately Rs.5 crores indeed a landmark in the corporate history of the as this is for the first time that a public sector un has invited the public to subscribe to its equity

HFL's PTFE has a wide spectrum of applicatio chemical, electronic and engineering industries a the strategic areas of defence, space research and research and it is marketed under the brand name which is available in eleven different grades in dispersion and filled forms. The grades have bee after careful study of the requirements of the diffe tors of the Indian economy. The quality of HIFL be comparable to the best available PTFE in the the plant has been put up in collaboration with ATC France, renowned for their capability in the petro world.

PERFORMANCE

Production

The company has been achieving a very high production and capacity utilisation for the past seve The production during 1987-88 of 1,47,136 tonn yet another peak level of performance.

Given below is the past six year's production

Year	Producti
1982-83	
1983-84	
1984-85	1,
1985-86	1.1
1986-87	1,
1987-88	1

It will be seen that over a period of five years, has achieved an annual growth rate of 14% in its performance. These spectacular results ha achieved due to de-bottlenecking operations, re wn maintenance and effective utilisation of critical nts in the plants.

s during the year 1987-88 were Rs.1250 lakhs. This was a peak performance in keeping with the tradi- the company to improve its performance every year. al sales recorded a very impressive growth during five years as also the export sales to the countries pan, US and European countries. Given below is the performance during last six years.

(Rs. Lakhs)

	Total sales	Export
83	4375	170
84	5012	140
85	6536	191
86	7047	245
87	8481	456
88	12500	650

les have increased from a level of Rs.43.75 crores in -83 to Rs.125 crores in 1987-88. Average growth rate s out to 38% per annum. This has been achieved despite act that during this period the chemical industry has through a very bad period of recession, by a judicious uct-mix and offering attractive incentives to customers.

he company's export performance is also impressive. age annual growth rate in export sales works out to In addition to earning foreign exchange directly on xports, the company also encourages other exporters mall and medium scale by offering the company's pro- s for their exports at concessional prices. so as to enable to be competitive in the international markets.

fit and Dividend

mpany has maintained its track record of earning of and payment of dividend to the Government. The s of profit before tax for the last five years is as under:

ar	Profit (Rs.lakhs)
982-83	446
983-84	426
984-85	611
985-86	648
986-87	852
987-88	950

It will be seen that profit has increased from Rs.446 lakhs in 1982-83 to Rs.950 lakhs in 1987-88 and the average annual growth rate works out to 22%.

The company is consistently paying dividend to Government for last 13 years. For the year 1986-87, the company paid a dividend of Rs.153 lakhs.

POLLUTION CONTROL MEASURES

We have put up a pollution control plant to treat the effluent wastes of various plants. This plant is the outcome of the efforts of our scientists to develop detoxification method based on solvent extraction. The existing pollution control facilities have cost us more than Rs.500 lakhs comprising of a pollution control plant, incinerator, neutralisation plant, aeration ponds and 9 km HDPE pipeline for discharge of treated effluent in the creek.

As far as air pollution is concerned, the brink mist eliminator and DCDA system in the Sulphuric Acid plant has helped us to keep SO_2 and SO_3 emissions within the prescribed limits. In the Concentrated Nitric Acid plant, ab initio, design of the plant was so made as to take into account the requirements of pollution control. The plant was so designed as to ensure that NOX emissions are well within the limits prescribed by the Pollution Control Board.

Further efforts are being made in achieving even better levels of pollution control in the following ways.

- **Bio-degradation**

  A research project was sponsored in National Environmental Engineering Research Institute (NEERI), Nagpur for the development of a micro-organism which can biologically degrade the pollutants in the effluents. NEERI has been successful in developing such a micro-organism in its laboratory. HOC has now put up a pilot plant to scale up the laboratory results to the pilot plant level. The results obtained from this pilot plant are highly encouraging and the proposals for erections of full scale commercial bio-degradation plant are being worked out. This will be a pioneering contribution in the area of using biodegradation technology for removal of nitro-bodies from the effluent.

- **Zero Effluent**

  A large quantity of treated effluent is now let out in a creek approved by the Pollution Control Board. An experiment has been started to mix the treated effluent from the plants with the treated sewage from the township so that the mix can be used for horticultural and agricultural purposes. The results of this experiment is successful and plans are afoot so that atleast after about five years the entire quantity of treated effluent will be used for horticultural and agricultural purposes.

INDUSTRIAL HYGIENE

HOC has got a unique industrial hygiene centre in its factory. At periodical intervals of 3 or 6 months depending upon the nature of the plant, each worker is subjected to a thorough medical check up. The results of the medical check up for each employee over the entire period of his service in HOC are tabulated. The above data is studied with a view to find out whether the chemical atmosphere in which the worker is operating has any long term deleterious effect on his physiological functions. So far no adverse effect has been noticed but however, the scientific collection of the data is continued to see whether with the passage of a few more years any such ill-effects will be noticed.

The Industrial Hygiene Centre is headed by a Chief Industrial Health Physician who is a qualified doctor with specialisation in industrial hygiene and he is assisted by one more doctor and two industrial hygiene scientists and other para-medical staff. The Centre possesses full knowledge of the possible health hazards to a worker in the different plants and is fully equipped to treat the worker if accidentally he is subjected to hazards such as cyanosis due to nitrobodies, inhalation of various vapours etc. The Scientists attached to the industrial hygiene centre are also monitoring the atmosphere by taking air samples inside different plants and also at varying distances from the plants upto 5 km and give valuable feed-back to the operating staff in the plants. They also on a daily basis collect samples of urine etc. of the workers and analyse them chemically to see whether the workers are subjected to a chemical atmosphere more severe than what their body can tolerate. These studies will help the Centre to establish proper TLVs (Threshold Limit Values) in Indian conditions. The company is striving to make this Industrial Hygiene Centre as a model for the entire country.

RESEARCH & DEVELOPMENT

The Research & Development Wing of HOC has grown from a modest level of two scientists on its roll in 1971-72 to a full fledged organisation with 19 scientists supported by about 70 technical and administrative staff. Most of the scientists have advanced degrees [illegible] degree holders, in organic chemistry, analytical chemis catalysis, or chemical engineering.

There are two laboratories with all modern facilities sophisticated analytical equipments. Besides, these laboratories there is a multi purpose pilot plant capable simulating any chemical process with any combination process parameters such as temperature and pressure. T R & D Division is currently engaged in:

-- Process development of selected chemicals.
-- Assimilation, absorption and improvement of impor technology.
-- Recovery of by-products.
-- Improving the productivity of raw materials & cataly
-- Special catalysis studies for the existing catalysts and a for developing new catalysts.

Some of the valuable contributions made by the R & Division are detailed below:

* **Resorcinol Recovery**

The process developed by our R & D led to the inst lation of a chemical plant for recovery of Resorcinol fr the waste effluent of Meta Amino Phenol plant and p ifying it to a commercial grade. This achievement w recognised by granting of a special award by All In Manufacturers Organisation.

* **Effluent De-toxification using solvent extracti method**

The Nitro-bodies in the effluents of the various nitrati plants of HOC are extremely difficult to deal with. T scientists of HOC have developed a process for det ification of effluents by "Solvent Extraction Metho This again was an award winning work for which Ind Chemical Manufacturers Association gave its award "Process Design and Process Engineering" in 1982.

* **In-situ regeneration of Aniline catalyst**

The imported technology from Sumitomo Corporati Japan, for manufacture of Aniline necessitated a t replacement of the catalyst after production of 4,0 tonnes of Aniline. By a special method developed by scientists we are now able to do in-situ regeneration the catalyst which leads to a saving of catalyst cost about Rs.40 lakhs per annum in foreign exchange

* **Pilot Plants**

The R & D Division has [illegible] successfully put up number of pilot plants for manufacture of M ichlorobenzene, Butene-diol and Cyclohexyl- ne.

purred by the success of these R & D efforts, the Com- y is determined to further intensify its R & D activities iverse fields. Some of the projects which are on hand as follows:

Value added products: Metanitrotoluene (MNT)

MNT is a co-product of Paranitrotoluene (PNT) and Orthonitrotoluene (ONT). While the latter two have commercial market, MNT has very limited market either in India or abroad. The scientists of our R & D have already successfully developed a laboratory process for conversion of MNT into Meta-Cresol. They are also now engaged in conversion of MNT into Di-ethyl-meta-toluidine (DEMT).

Dichlorobenzene (DCB)

In the existing Monochlorobenzene (MCB) plant about 150 tonnes of mixed ortho and para di-chlorobenzenes are produced as byproducts. A laboratory process is under development to convert this mixture into Meta-dichlorobenzene (MDCB), a high value product with export possibilities.

Specialised Catalysis studies

In Formaldehyde plant to replace the existing costly Silver catalyst by catalyst based upon cheaper metals. Similarly studies have been taken up for development of new catalyst (5% ruthanium on carbon) for CHA plant to give 3-4 times increase in conversion and productivity as compared to the existing catalyst.

Studies in the catalysts in all the other plants such as Hydrogen, Concentrated Nitric Acid are being taken.

Process Development for new products

Development of process for N-ethylaniline, N-ethyl Orthotoluidine and N-ethyl Meta-toluidine which are intermediates for disperse dyes having an increasing demand due to the growth of the synthetic fibre industry are taken up.

CONCERN FOR RURAL NEIGHBOURHOOD

Apart from providing various welfare measures like Med- facilities, free education in HOC School, Recreation, Sports and culture etc. to our employees, Company has been deeply conscious of its social obligations, undertaken many significant measures for the improvement of quality of life in the rural neighbourhood. Some of the important activities/projects are as follows:

Rural Health and Hygiene

Even today, medical facilities are woefully inadequate in the neighbourhood and the Company has taken several steps to improve the health and hygiene facilities in this area.

The HOC Hospital, caters not only to the employees of the Company and their family members, but the villagers in the area are also attended to by the hospital at nominal charges or in deserving cases, free of cost.

* *Dr. Kasbekar Memorial Community Vision Trust*

Employees of the company have formed the above trust primarily to extend eye care to the poor villagers. The company has made a capital donation of Rs.5 lakhs to the corpus of the trust and is assisting the trust in several ways such as lending the services of its medical professionals or hospital facilities for the activities of the trust. So far the trust has provided spectacles, after testing, to more than 2,000 villagers and carried out operations on 200 patients.

* *Total medi-care scheme*

Moved by the response to its 'eye care', the trust has now widened its activities and company has adopted 50 villages in the rural neighbourhood for extending medical facilities and to educate the villagers on health, hygiene, sanitation, cleanliness, family planning, child care etc. Fifty women belonging to the respective villages have been trained as 'Village Level Health Workers' in First-Aid and dispensing for minor illness.

Special Medical Kits have been provided to these workers for the purpose. The Village Level Health Workers conduct regular survey in these villages and attend to the primary medical needs of the villagers and educate them on family planning, sanitation, cleanliness etc.

Cases requiring pathological tests, X-ray or periodical medical examination are referred by the Village Level Health Workers to the HOC Hospital. HOC Hospital staff also conduct periodical survey and give necessary guidance and medical advise to the villagers. This has resulted in 'Total Medi-care' to these fifty villages and it is proposed to further extend this activity to other villa

Education

* *School for Adivasi Children*

With the active support of the Company, Mahila Udyog Mandal a voluntary organisation formed by the wives of the company's employees, is running pre-primary and primary school for Adivasi children at Parade, near Rasayani. About 50 children are availing of this education facility every year. The objective in conducting these classes is to impart basic knowledge of health, hygiene, cleanliness and basic education in order to create an interest in them to join the main-stream of the Society. Breakfast is given to the school children daily. Uniforms and books are also given free of cost to the children.

There is a remarkable progress in these children since the school started in 1977. In fact, some of the bright adivasi students have been admitted in a regular school for their further education. For each such student, some families in HOC are donating Rs.25/- per month to the parents so that the students may not be withdrawn from school for helping them in earning their livelihood.

* *Balwadis*

With a view to encourage the children in education through sports and recreation, three balwadis have been established at Mohopada, Savale and Gulsunde villages at a cost of Rs.26,000/-. About 1,500 children in these villages take advantage of this facility.

* *Nursery schools*

Two nursery schools and two K.G. classes are being run with a total strength of about 50 children from the surrounding villages.

* *Training in Tailoring*

A Centre for tailoring has been established where village women are given special training in tailoring. Some deserving students are granted stipend. Students, after successful completion of one year training, are awarded Diploma in Tailoring by Government of Maharashtra. Trained ladies have been able to start their own tailoring business under self-employment scheme. So far more than 500 women in the neighbouring villages have taken advantage of this facility and started earning substantial supporting income for their families.

* *Training in Typewriting and Shorthand*

With the active support and assistance by the Company, a technical institute is imparting training in typewriting and shorthand. Successful candidates are awarded certifica by Government of Maharashtra, enabling them to g employment opportunities in neighbouring industries. It worth mentioning that the HOC Employee's Union managing the day to day working of the Institute.

* *Financial Assistance to SC/ST students*

The Company has been concerned with the situation th the technical posts reserved for SC/ST communities cou not be filled up for want of qualified candidates. For t benefit of meritorius students of various institutions aff iated to the universities in Maharashtra and other State HOC has launched a scholarship scheme under which sch larships ranging from Rs. 150/- to Rs. 500/- per month a awarded to students of various technical and profession courses at the graduate and post-graduate levels during the pre-final and final years of studies. The objective of th scheme is two-fold; firstly to help the needy and deservi students of SC/ST communities in their aspirations f further studies and secondly in building up a ready tec nical reservior from which the country can benefit in t long run. After successful completion of their courses the are given vocational training in HOC and are given gua antee of employment in the company.

Other Rural Development Work

* *Drinking Water*

The villagers suffer from lack of adequate drinking wate especially during summer. HOC has provided water fro its own grid to five villages and helped another three wi financial and technical assistance for implementation water supply schemes.

* *Drought Relief*

As a part of its drought relief activities, the company h undertaken several measures in drought prone areas Maharashtra and Kerala States.

In Maharashtra State we have identified four villages Parner taluka of Ahmednagar district for supply of drin ing water. The scheme involves laying of pipe line, cor struction of water works, Settling Tanks, water purificatio tanks, Boosting Stations, stand post, etc. This area is facin acute shortage of drinking water and at present the supp is made by water tankers.

The scheme will be able to provide drinking water suppl to population of 14,000 numbers. Total expenditure for th eme will be Rs.50 lakhs of which major share (Rs.27.50 hs) will be met by our company.

In Kerala State we have identified two villages where work of digging two bore wells has already started. The al expenditure will be Rs.3 lakhs.

In addition to this, we have contributed Rs.1 lakh for pro- ding drinking water supply to a town Tripunithura. The heme is being implemented by Government of Kerala.

Roads

HOC has constructed approach roads to following vil- ages at a cost of about Rs.10 lakhs.

) Construction of a 6.5 km approach road from Bombay-Pune National Highway to Rasayani. (This is now classified as "Major District Road").
ii) 500 metre road to Savale Village
iii) 1 km motorable road from Rasayani to Savale.
iv) 800 metre motorable road between old Posari and Savale Village.
v) Approach road at Turade, Waveghar, Ladivali, New Posari and Ambivali villages, at the request of village Panchayats.
vi) Contribution to Government of Maharashtra for construction of an 8 km Kon-Savale Road.

CONCLUSION

Our policy has always been to achieve the twin objectives of commercial success by way of continual growth with financial soundness on the one hand and dedicated service to the society at large on the other. The future beckons to us with its glittering opportunities for commercial success and social service. By the magic of devoted work we shall take full advantage of these opportunities.

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IP/BP

CHEMICAL Formula

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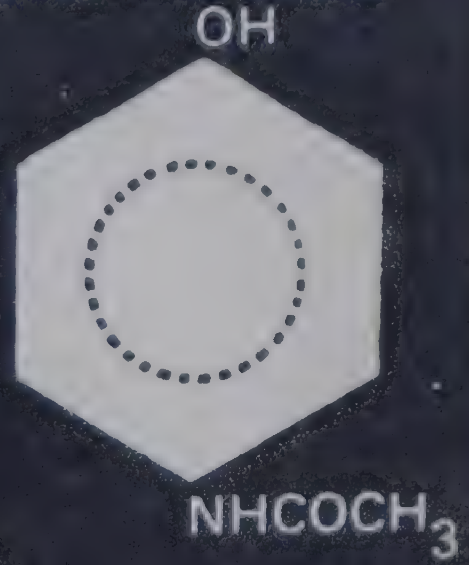
4′ — Hydroxyacetanilide
P — acetylaminophenol
N — Acetyl p-aminophenol
P — acetaminophenol
P — acetamidophenol

STRUCTURAL Formula



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ex: 425-6842 RCPL IN
hone: 74937/823598/848125.

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hone: 434994/434057
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hone: 241262
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STATISTICS

CAPACITY & PRODUCTION OF CHEMICAL INDUSTRIES DURING THE YEAR 1986-87 & 1987-88

('000 tonn

ndustry/Item	1986-87 Inst. Cap.	1986-87 Production	1987-88 Inst. Cap.	1987-88 Prodn. (Est.
1	2	3	4	5
norganic Chemicals				
Caustic Soda	992.0	744.0	1045.0	800.0
Soda Ash	1005.0	983.0	1005.0	990.0
Liquid Chlorine	770.0	310.0	770.0	315.0
Calcium Carbide	218.0	72.5	218.0	75.0
Potassium Chlorate	25.0	8.8	25.0	9.5
Carbon Black	245.0	96.8	245.0	98.0
Red Phosphorous	1.4	1.1	1.4	2.0
Acetylene Black	4.7	2.1	4.7	2.5
Titanium Dioxide	46.5	14.4	46.5	15.5
Bromine	1.4	1.0	1.4	1.5
Organic Chemicals				
Acetone	35.0	24.7	35.0	26.0
Phenol	21.6	18.6	21.6	19.0
Methanol	81.0	78.2	81.0	80.5
Acetic Acid	80.7	45.7	80.7	50.0
Acetic Anhydride	28.0	14.9	28.0	15.5
Pentaerythritol	5.4	5.4	5.4	5.5
Dyes & Dyestuffs				
Dyes & Dyestuffs	34.0	20.5	34.0	22.0
Pesticides (Tech.)				
Insecticides				
B.H.C.	41.90	25.40	41.90	26.00
D.D.T.	9.09	8.00	9.09	9.00
Malathion	12.00	2.70	10.00	3.50
Parathion	2.76	1.20	2.76	1.50
Metasystox	0.26	0.23	0.26	0.35
Fenitrothion	0.60	0.08	1.40	0.10
Fenthion	0.36	0.27	0.36	0.30
Dimethoate	1.69	1.10	2.00	1.50
hosphamidon	1.12	1.10	1.12	1.50

1	2	3	4	5
D.D.V.P.	0.53	0.43	0.53	0.55
Quinalphos	1.34	0.60	1.34	1.00
Ethion	0.40	0.24	0.60	0.30
Carbaryl	2.00	0.05	2.00	0.05
Monocrotophos	1.20	1.90	1.48	2.00
Endosulphan	2.40	2.20	2.40	2.50
Thimet (Phorate)	1.20	1.50	1.50	1.50
Phosalone	1.00	0.07	1.00	0.25
Fenvalerate	0.55	0.35	0.65	0.55
Cypermethrin	0.30	0.13	0.60	0.50
Fungicides				
Copper Oxychloride	2.46	1.20	2.46	1.50
Captafol	0.10	0.05	0.10	0.08
Captan	0.10	0.07	0.10	0.10
Thiocarbamates	3.48	2.90	3.48	3.00
Nickel Chloride	0.30	--	0.30	--
Organo Mercurials	0.18	0.20	0.18	0.30
Barbandazin (Bavistin)	0.73	0.16	0.73	0.20
Herbicides				
2,4-D	2.13	0.81	2.13	0.90
Weedicides				
Isoproturon	1.68	0.92	1.68	1.20
Paraquat (Gramoxone)	0.50	0.25	0.50	0.30
Basaline	0.06	.025	0.06	0.03
Dalapon	0.13	Neg.	0.13	Neg.
Diuron	0.20	0.14	0.20	0.15
Plant Growth Regulants				
Cycocil/Lihocin	0.18	--	0.18	--
A.N. Acetic Acid	0.02	--	0.02	--
Rodenticides				
Ratafin	0.05	Neg.	0.05	Neg.
Zinc Phosphide	1.22	0.43	1.22	0.50
Fumigants				
Aluminium Phosphide	1.82	1.34	1.82	1.50
Methyl Bromide	0.30	0.07	0.30	0.10
Ethylene Dibromide	0.26	0.04	0.26	0.05
Antibiotics (Agri.)				
Aureofungin	0.50	--	0.50	--
Streptocycline	--	--	--	--
Total Pesticides	*97.10*	*56.26*	*97.39*	*62.86*

Source: Annual Report of Department of Chemicals & Petrochemicals [illegible]

DRUGS AND PHARMACEUTICALS (MONITORED BULK DRUGS) PRODUCTION TARGETS AND ACHIEVEMENTS (ORGANISED SECTOR)

ne of the Drug	A/c. Unit	1985-86	Production 1986-87		1987-88
			Target*	Actual	Target*
1	2	3	4	5	6
ANTIBIOTICS			450.00#		480.00#
icillin	MMU	269.11	1070.00$	266.64	1285.00$
eptomycin	T	188.32	270.00	203.88	270.00
loramphenicol Powder	T	79.75	300.00	60.50	300.00
loramphenicol Palmitate	T	8.58	--	11.10	--
tracycline	T	227.39	360.00	184.04	380.00
ytetracycline	T	142.14	180.00	75.86	185.00
npicillin	T	121.28	380.00	158.45	440.00
ythromycin	T	51.48	65.00	42.14	70.00
moxicillin	T	3.97	95.00	14.07	110.00
oxycycline	T	9.98	8.00	9.72	9.00
entamycin	Kg.	166.47	1750.00	--	2010.00
. SULPHA DRUGS					
ulphamethoxazole	T	562.78	470.00	535.42	540.00
ulphadimidine	T	487.58	730.00	268.84	760.00
ulphacetamide/Sod.	T	33.92	80.00	48.50	80.00
ulphamethizole	T	--	4.00	--	4.00
ulphadiazine	T	18.85	120.00	40.67	130.00
hthalyl Sulphathiazole	T	--	280.00	--	290.00
ulphamoxole	T	103.66	120.00	76.99	130.00
ulphasomidine	T	75.48	70.00	40.56	80.00
ulphaphenazole	T	54.62	75.00	37.64	80.00
ulphaguanidine	T	208.06	285.00	115.92	285.00
ulphanilamide	T	7.03	30.00	3.00	30.00
II. VITAMINS					
Vitamin A	MMU	61.04	140.00	69.34	160.00
Vitamin B1	T	58.41	150.00	49.85	160.00
Vitamin B2	T	24.04	60.00	8.69	65.00
Vitamin B12	Kg.	176.97	440.00	193.43	480.00
Vitamin C	T	651.26	1050.00	773.98	1100.00
Vitamin D3	Kg.	348.67	435.00	388.76	480.00
itamin E	T	67.05	20.00	60.94	20.00
itamin K	T	0.41	2.43	--	2.55
tamin P	T	4.75	4.50	2.69	4.50
Folic Acid	T	7.65	11.00	6.65	12.00
icotinic Acid	T	11.85	350.00	6.97	385.00
Nicotinamide	T	141.31	--	145.19	--
IV. ANALGESICS, ANTIPYRETICS, ETC.					
Analgin	T	208.32	1000.00	136.35	1000.00
Aspirin	T	1514.33	2060.00	1835.37	2260.00
Phenyl Butazone	T	53.61	100.00	36.94	100.00
Oxyphenbutazone	T	26.63	145.00	10.40	165.00

1	2	3	4	5	6
Paracetamol	T	1.46	4370.00	--	5030.00
Pethidine	Kg.	314.00	1320.00	404.00	1450.00
Ibuprofen	T	99.63	90.00	96.65	100.00
V. CORTICOSTEROIDS					
Dexamethasone	Kg.	248.99	1050.00	321.18	1210.00
Betamethasone	Kg.	751.37	1220.00	824.00	1410.00
Prednisolone	Kg.	1721.00	4800.00	1961.00	5280.00
VI. ANTI-TB DRUGS					
PAS & its salts	T	106.98	250.00	86.33	250.00
INH	T	144.34	325.00	188.59	375.00
Thiacetazone	T	19.23	70.00	28.93	75.00
Ethambutol	T	300.72	260.00	299.87	310.00
Pyrazinamide	T	3.21	27.50	2.82	30.00
VII. ANTI-MALARIALS					
Chloroquin	T	185.00	410.00	177.61	430.00
Amodiaquin	T	34.50	40.00	45.02	42.00
VIII. ANTI-DYSENTERY DRUGS					
Metronidazole	T	318.89	330.00	333.14	400.00
Tinidazole	T	22.43	56.00	49.04	64.00
Diloxanide Furoate	T	22.95	40.00	8.87	44.00
Iodochlorohydroxyquinoline	T	141.04	340.00	200.48	380.00
Di-iodohydroxyquinoline	T	4.98	120.00	4.83	130.00
Intestopan Substance	T	69.98	70.00	37.35	70.00
IX. ANTI-DIABETICS					
Chlorpropamide	T	19.85	37.00	30.33	40.00
Tolbutamide	T	15.33	40.00	29.03	40.00
Glybenclamide	T	0.86	1.17	1.30	1.29
Insulin	MU	2730.00	3370.00	2352.00	3700.00
X. CNS STIMULANTS					
Caffeine	T	17.83	120.00	15.57	130.00
Nikethamide	T	1.58	6.00	0.06	6.00
XI. DIURETICS					
Frusemide	T	7.06	12.00	6.59	13.00
XII. ANTI-ASTHAMATICS					
Ephedrine	T	14.07	58.00	16.79	63.00
Salbutamol	T	0.85	2.20	2.05	2.42
Terbutaline	T	0.40	0.32	0.42	0.36
XIII. CARDIOVASCULAR DRUGS					
Propranalol	T	7.89	10.50	7.07	12.07
Xanthinol Nicotinate	T	20.74	17.00	10.74	18.00
Methyl Dopa	T	31.79	44.00	48.46	51.00
Digoxin	Kg.	28.93	29.00	37.00	32.00
XIV. ANAESTHETICS					
Lignocaine/Xylocaine	T	8.90	53.00	7.18	61.00
Procaine	T	24.83	85.00	44.13	89.00

# = Formulations; $ = Drug Intermediates; * = Seventh Plan Demand Estimates.

(Source: Annual Report of the Department of Chemicals & Petrochemicals (1987-88).

CAPACITY AND PRODUCTION OF DYESTUFFS IN INDIA DURING 1983-84 TO 1985-86)

(Quantity in Tonnes)

n	1983-84		1984-85		1985-86	
	Inst. Cap.	Production	Inst. Cap.	Production	Inst. Cap.	Production
o Dyes	3545	2504	3545	2303	3545	2155
id Direct Dyes (other than Azo Dyes)	629	178	629	159	629	176
sic Dyes	1137	83	1137	131	1137	44
sperse Dyes	1674	1711	1674	1975	1674	2135
st Colour Bases	1709	546	1709	720	1709	550
od Colours	220	39	220	61	220	66
grain Dyes	752	180	752	205	752	188
il Soluble Colours (Solvent Dyes)	176	24	176	37	176	13
aphthols	1615	1007	1615	1126	1615	921
ptical Whitening Agents	1502	590	1502	677	1502	534
rganic Pigments	3974	3160	3974	3671	3974	3438
igment Emulsion	5374	2902	5374	2838	5534	2827
eactive Dyes	4675	2175	4675	2110	4675	2420
tabilized Azoics	685	137	685	64	685	47
ulphur Dyes	2610	985	2610	1497	2610	1451
at Dyes	2400	1736	2400	1764	2400	1660
olubilised Vats	370	144	370	89	370	116
crylic Fibre Dyes	650	5	650	13	650	4
ther Miscellaneous Dyes	--	--	--	--	--	--
Total	**33697**	**18101**	**33697**	**19440**	**33697**	**18745**

(Source: Indian Chemical Statistics -- 1987)

ATTENTION

ACTUAL USERS AND IMPORT LICENCE HOLDERS
FOR YOUR REQUIREMENTS OF CHEMICALS, DYESTUFFS,
DYE-INTERMEDIATES AND ALLIED ITEMS
PLEASE CONTACT US FOR THE MOST COMPETITIVE CIF PRICES

Mr. DHAIRESH K. SANGHVI

M/s. KANTILAL SANGHVI & CO.

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Phone: (Office): 2870836/2873217/2873628/2874153; (Resi): 4226850/4229086
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SERVING VARIOUS INDUSTRIES SINCE LAST ABOUT 45 YEARS

STATEMENT SHOWING CAPACITY AND PRODUCTION OF NITROGENOUS FERTILIZERS

('000 MT)

Name of the Company	Inst. capacity as on 1st Oct. '87	Actual production 1986-87	Est. production 1987-88
A. PUBLIC SECTOR			
1. Fertilizer Corpn. of India Ltd.			
Sindri Modn.	219	135.3	136
Gorakhpur	131	84.1	75
Ramagundam	228	113.2	50
Talcher	228	58.8	89
Total (FCI)	*806*	*391.4*	*350*
2. National Fertilizers Ltd.			
Nangal-I	80	57.1	60
Nangal-II	152	134.3	135
Bhatinda	235	169.4	190
Panipat	235	190.0	220
Vijaipur, Guna	..	..	25
Total (NFL)	*702*	*550.8*	*630*
3. Hindustan Fertilizers Corporation Ltd.			
Namrup-I	20	8.8	5
Namrup-II	152	86.9	87
Namrup-III	177	..	65
Durgapur	152	50.8	60
Barauni	152	61.6	80
Total (HFC)	*653*	*208.1*	*297*
4. Fertilizer & Chemicals Travancore Ltd.			
Udyogmandal	78	52.5	53
Cochin-I	152	105.5	86
Cochin-II	81	80.0	84
Total (FACT)	*311*	*238.0*	*223*
5. Rashtriya Chemicals & Fertilizers Ltd.			
Trombay	90	85.7	90
Trombay-IV	75	61.7	58
Trombay-V	152	153.7	121
Thal	683	479.2	600
Total (RCF)	*1000*	*780.3*	*869*
6. Madras Fertilizer Ltd.			
Madras	176	157.3	55
7. Steel Authority of India Ltd., Rourkela	120	40.0	47
8. Neyveli Lignite Corporation	70	58.9	58
9. Paradeep Phosphates Ltd. (PPL)	130	76.1	74
By-Product	30	13.1	14
Total Public Sector	*3998*	*2514.0*	*2617*

('0

Name of the Company	Inst. capacity as on 1st Oct. '87	Actual production 1986-87	Est. duct 1987
B. PRIVATE SECTOR			
Gujrat State Fert. Co. Baroda	236	253.5	24
Coromandal Fert. Ltd. Vizag	84	74.6	6
Shriram Fertilizers & Chem.. Kota	152	147.2	11
Indian Explosives Ltd., Kanpur	310	270.6	23
Zuari Agro Chem Ltd., Goa	198	215.0	20
Southern Petrochemical Industrial Corp. Ltd. Tuticorin	313	334.9	300
Mangalore Chem. & Fertilisers Ltd., Mangalore	181	141.8	95
EID Parry India Ltd., Ennore	8	11.4	11
Hari Fertilizers, Varanasi	10	3.1	4
Gujarat Narmada Valley Fertiliser Corporation Bharuch	273	283.9	286
HLL, Haldia	29	17.0	24
TAC, Tuticorin	16	12.1	12
P.N. Fertilizers	16	6.3	10
Gujarat State Fertiliser Corporation Sikka, By-Product	12	6.6	5
Gujarat State Fertiliser Corporation Sikka	..	..	4
CF & CL, Kakinada	..	..	4
Total Pvt. Sector	*1837*	*1778.0*	*1613*
C. COOPERATIVE SECTOR			
Indian Farmers Fertilizers Cooperative Ltd.			
Kalol/Kandla	302	316.4	300
Phulpur	228	222.2	200
Total (IFFCO)	*530*	*538.6*	*500*
Krishak Bharati Cooperative Ltd.			
Hazira	668	579.4	700
Total: Coop. Sector	*1198*	*1118.0*	*1200*
GRAND TOTAL	*7033*	*5410.0*	*5430*

STATEMENT SHOWING CAPACITY AND PRODUCTION OF PHOSPHATIC FERTILIZERS

('000 MT)

of the Company	Inst. capacity as on 1st Oct. '87	Actual production 1986-87	Est. production 1987-88
UBLIC SECTOR			
lizers & Chemicals Travancore Ltd.			
Udyogamandal	37	30.3	28
Cochin-II	112	90.0	96
Total (FACT)	*149*	*120.3*	*124*
htriya Chemicals & Fertilizers Ltd.			
Trombay	45	39.7	45
Trombay	75	61.7	58
Total (RCF)	*120*	*101.4*	*103*
dras Fertilizers Ltd.			
Madras	112	103.0	61
dustan Copper Ltd.		..	
Khetri	30*	7.8	8
adeep Phosphate			
(PPL)	331	194.5	189
Units	35	7.0	15
ites Phos. & Chem.			
Ltd. (PPCL)	..	24.0	..
tal Public Sector	**777**	**558**	**500**

('000 MT)

Name of the Company	Inst. capacity as on 1st Oct. '87	Actual production 1986-87	Est. production 1987-88
B. PRIVATE SECTOR			
Gujarat State Fertilizer Co.			
Baroda	50	70.1	75
Coromandal Fertilizers Ltd.			
Vizag	104	77.6	71
Zuari Agro Chemicals Ltd.			
Goa	111	114.8	100
SPIC Ltd.,			
Tuticorin	191	148.5	123
Mangalore Chem. & Fertilizers			
Mangalore	63	..	28
EID Parry India Ltd.			
Ennore	10	14.2	13
HLL, Haldia	73	43.4	62
SSP Units	575	291.4	372
GSFC, Sikka	..	..	9
C.F. & C. Ltd.			
Godawari	..	..	9
Total Private Sector	*1177*	*760.0*	*860.0*
C. COOPERATIVE SECTOR			
IFFCO			
Kandla (I & II)	309	342.0	300
GRAND TOTAL	*2263*	*1660.0*	*1660*

pacity of HCL, Khetri has been reduced to 30,000 P_2O_5 from 90,000 MT.

"Thinking Bulk ?
. . .Think CTTL"

CHEMICAL TERMINAL TROMBAY LIMITED

Tata Vidyut Karyalaya,
Murzban Road,
BOMBAY 400 001.
Just Dial: 204 1073 / 204 8331

EXPORTS OF CHEMICALS AND ALLIED MATERIALS DURING 1986-87 AND 1987-88)

(Estimate in '000 Rupees)

Items	Exports during April 86 To March 87	Exports during April 87 To Feb. 88
1	2	3
Drugs, Pharmaceuticals & Fine Chemicals		
Folic acid	155.5	92.0
Riboflavin	--	526.4
Vitamin C	204.7	16.5
Vitamin B Complex	--	255.1
Provitamin, Vitamin natural or reproduced n.e.s.	275.4	10431.3
Other Antibiotics and their preparation	15175.6	3130.0
Berberine Hydrochloride	1382.9	2422.6
Emetin Salts/Hydrochloride	390.7	2852.7
Ephedrine Hydrochloride	458.1	315.3
Quinine Sulphate	2363.1	8163.5
* Quinine Hydrochloride	--	735.6
Strychnine Alkaloids/Salts	2131.7	2218.8
Salts & other derivatives of Nux Vomica alkaloids/Brucine	9762.7	17592.4
Vaccine other	6599.2	783.3
Ayurvedic & Unani Medicines	43656.6	17456.0
Chloramphenicol preparation and derivatives	232.0	841.2
Homeopathic Medicines	4.8	66.3
Anti-Malarial Chloroquin and Chloroquin Phosphate	1023.2	270.3
Cold, Cough, Bronchial prepns. except salves, ointments and vaccines	2115.2	433.3
Gripe Water	1988.6	2465.5
Headache, Neuralgia & Pain remedies	388.8	820.0
Magnesium Trisilicate	374.4	25.4
Sulpha Drugs	2535.4	--
Salves, Ointments for burns, cuts, etc.	1233.3	1070.1
Tonics, blood purifiers, emulsions	69.3	68.4
Proprietary & Patent Medicines	[illegible]	67992.6
Medicinal Castor Oil	[illegible]	[illegible]
Other Medicaments	293986.3	357770.3
Absorbent Cotton Wool	[illegible]	7022.5
Wadding & Articles of wadding n.e.s.	19	
Adhesive/Tape (medicines)		
Cotton Wool (medicated)		
Kaolin, Poultice of		
Lint (medicated)		
Plaster of Paris (Surgical)		
Bandages n.e.s.		
Dental Cement and other dental filling		
First Aix Boxes		
Sterile Laminaria		
Sterile Surgical Catgut		
Chloroform	2	
Menthol	6	
Potassium Citrate		
Undecylenic Acid	10	
Phenol phthalein	1	
Di-Iodohydroxyquinoline	5	
Iodohydroxyquinoline		
Ether Solvent/Ethyl Ether	1	
Beta Ionone	69	
Papain Pure	27	
Aluminium Hydroxide	8	
Potassium Iodide	16	
Hydrogen Peroxide	1	
Empty Gelatine Capsules		
* Harmless Medicines	197	
* Paracetamol	34	
* Veterinary Medicines	16	
* Tolbutamide	4	
* Ethambutol Hydrochloride	45	
* Drug Intermediates	266	
* Calcium Compound		
* Calcium Sennoside	1	
* Fine Chemicals	2	
* Sodium Citrate	3	
* Thiacetazone	2	
* Sodium Iodide	12	
* Solanesol	1	

1	2	3
l O-phenyl glycine	17413.0	4659.0
e HCl	10081.2	6302.2
nide	9309.7	13692.8
nzene	15089.9	3844.3
ide	115200.0	8944.7
ide Benzoate	—	4387.6
e	21600.0	16505.8
e	22500.0	1000.0
	4900.0	213.6
	1000.0	1000.0
	15000.0	4899.3
nates	88500.0	213.8
e, vinrysiaite	—	98.0
proprionate	—	1621.5
ion Sulphate	237714.0	4590.2
ype	—	1227.5
ate Trihydrate	601.9	—
ide	3161.8	—
ophene	4700.0	4814.9
	3400.0	2500.00
	1500.0	884.0
l Sulphate		
Benzene Sulphonyl	2000.00	1880.5
	2500.0	728.2
arbamazine Citrate	15400.2	5481.1
e	78070.0	14287.2
ide	195701.9	17848.1
	1090.0	16230.3
ron	17822.2	8692.2
in Stearate	—	13216.7
ycin Estolate	41594.0	16562.1
n Trihydrate	2010.0	5000.0
n Butanol	1415.5	1872.5
ingredients	2229538.2	1862793.4
	N.A.	N.A.
ports		

rmediates, Alcohol and Coal Tar Chemicals

1	2	3
	3702.7	14128.1
	1823.1	13391.6
	9724.4	18386.2
	135010.0	125368.8
nic/Organic Pigment	120000.0	144468.7
yes		
Reduced Vat Dyes	65597.3	18490.9
ed Vat Dyes	—	1585.2
	—	3071.2
ts	—	2981.2
yes	210.6	431
	142.7	2094

1	2	3
Fluorescent Brightening Agent	2285.3	3603
Beta Hydroxy Naphthoic Acid	343.6	85.6
(BON Acid)	—	1584.5
Beta Naphthol	1761.2	5554.1
Benzidine Dihydrochloride	9131.3	4345.3
Dichlorobenzidine Sulphate	778.9	2479.5
Anthranilic Acid	—	955.9
Amino Anthraquinone	—	265.4
Benzanthrone		
2-Chloro-5-Toluidine-4-	—	979.8
Sulphonic acid	147.2	22371.0
Chicago Acid	666.2	1673.6
Aceto Acetanilide	—	8234.5
Gamma Acid	69100.0	118524.8
H. Acid	1233.8	1405.7
Laurent's Acid	15957.4	18813.9
Metanilic Acid	1539.9	1298
Peri Acid	7786.7	29173
Anthraquinone	—	597
G. Salt	66.2	1159
R. Salt/R. Acid	211.9	7466
Naphthol	154.8	384
Sulphanilic Acid	—	1550
Dibenzanthrone	502.2	695.4
* Sulphonic Acid	—	3777.7
* Sodium Metanitrobenzene	115665.5	481771.7
* Coal Tar Dyes n.e.s.	166453.2	321872
* Dyes Intermediates	488782.7	1660
Total	N.A.	N.A.
Deemed Exports		

Basic Inorganic & Organic Chemicals including Agro Chemicals

1	2	3
Inorganic Chemicals	5315.6	7258
Phosphorous Red	523.2	809.5
Chlorine	—	1690.7
Sulphuric Acid	323.8	1180.6
Hydrochloric Acid	18.6	391.8
Silica Gel	1386.59	2061.1
Manganese Dioxide electrolytic	73.4	
Liquid Ammonia		
Caustic Soda/Sodium Hydroxide Flakes Caustic Soda/Sodium Hydroxide Lyes	—	315
	213	1878
Nitrous Oxide	998.8	11815.0
Aluminium Chloride	—	466
Boric Acid	—	0.8
Calcium Chloride		

1	2	3
Ammonium Chloride	307.8	150.9
Magnesium Chloride	107.1	--
Mercuric Chloride	2334.0	1339.9
Rare Earth Chloride	69741.1	50782.9
Bleaching Powder	9820.0	14431.5
Sodium Sulphate	501.0	1670.4
Aluminium Sulphate Iron Free/ Alumina Ferric/Ferric Alumina	36.5	1798.9
Ammonia Alum	--	30.5
Copper Sulphate	53.0	44.6
Other Sulphates & Alums	1428.7	0.3
Potassium Nitrate	--	107.3
Calcium Phosphate	--	123.9
Calcium Dibasic Phosphates	15040.0	14338.1
Sodium Carbonate	138.7	0.6
Ammonium Bicarbonate	12.0	63.3
Barium Carbonate n.e.s.	2402.7	2385.0
Calcium Carbonate	149.0	17.9
Manganese Carbonate	854.3	489.8
Sodium Bicarbonate/Papad Khar	171.4	196.3
Sodium Silicate	61.4	--
Potassium Permanganate	--	443.8
Ammonium Sulphate	379.9	391.3
Sodium Chloride	--	128.4
Sodium Cyanide	30007.0	22143.5
Sodium Borate/Borax	2393.4	2569.1
Silicon Carbide	10000.0	6252.1
Other Inorganic Chemicals	13344.1	29452.6
Phthalic Anhydride	22682.3	48781.0
* Thorium Nitrate	81.3	175.3
* Rare Earth Fluoride	6326.6	11030.8
* Catalyst Chemicals	3780.8	7770.0
* Phosphorous Trichloride	--	4387.7
* Ferric Chloride	--	410.7
Thionyl Chloride	--	2607.2
Sodium Hydrosulphite	--	4746.3
* Alumina Hydrate	--	4642.2
* Sulfamic Acid	1907.8	30.2
* Cuprous Chloride	677.0	1861.3
* Laboratory Chemicals	668.9	821.9
* Thorium Oxide	261.2	58.7
* Dehydrated Culture Media	2755.7	1405.6
* Ion Exchange Resin	18667.0	14817.0
* Micro Crystalline Powder	2891.7	1034.7
Total (A)	*232018.3*	*277270.3*
Deemed Exports	NA	6036.5
Organic Chemicals		
Acetic Acid	--	935.3
Oxalic Acid	1246.0	2147.3

1	2
Citric Acid	490.1
Meta Amino Phenol	27064.8
Organic Compounds Others	27000.0
Starches Others	4253.6
Waxes, n.e.s	167.8
Aromatic Chemicals in packages not exceeding 500 grams for mfg. of perfumes	5200.0
Charges for fire extinguisher	623.2
Electroplating Salts	756.4
Activated Carbon	42.8
Rubber Chemicals	4714.8
Sodium Carboxy Methyl Cellulose	2.8
* Methylene Chloride	
* Transformer Oil	
* Foundry Chemicals	2447.4
* Chlorinated Paraffin	--
* Fatty Alcohol	--
Total (B)	*81027.4*
Deemed Exports	6700.0
Agro Chemicals	
Nicotine Alkaloids	2034.1
Nicotine Sulphate	42013.0
Aluminium Phosphide	8409.7
Pesticides others, insecticides n.e.s.	259000.0
Zinc Phosphide	3849.1
* BHC Dust	--
* Endosulphan Tech.	3771.4
* Quinalphos	21.0
* Melamine	--
* Malathion	--
Total (C)	*349165.3*
Deemed Exports	NA
Total (A+B+C)	*662191.0*
Total of Deemed Exports	*6700.0*
Glycerine, Soaps, Detergents, Cosmetics & T	
Rose Water	518.4
Cosmetics & Toiletries preparations n.e.s.	258381.5
Medicated Soaps	3542.2
Synthetic Detergents	382600.0
Scouring Powder	13597.9
Hydrogenated Castor Oil	1.8
Textile Chemicals Auxiliaries	592.9
Stearic Acid	167.9

1	2	3
arite Powder		
Talc	3483.7	2358.2
ves & Powder	81500.0	17984.5
	72.2	77.2
dehydrated	8350.0	12427.4
a	16970.9	3334.6
Refined	--	7244.1
s & Alums	3100080.0	235808.7
Water	266.2	271.0
ry Soaps	163.8	182.3
ury Stearic Acid	2500.00	3452.0
	847600.0	662862.9
Exports	65780.0	64020.0
Oils		
Oil	1664.9	717.5
	19.2	782.7
Oil	--	89.0
l	18360.0	4297.3
us Oil	29160.6	18279.5
Oil	1210.1	746.5
ed Oil	145060.0	64101.6
Oil	0.8	--
at Oil	490.4	1161.3
Oil n.e.s	30623.0	9772.9
Rosa Oil	231.4	346.3

1	2	3
Cedarwood Oil	--	105
Davana Oil	1164.5	1124
Jasmine/Tuberose concentrate	6980.0	12820
Total	*236964.9*	*114344*
Deemed Exports	NA	NA
Crude Drugs		
Chirata	--	33
Nux Vomica	--	813.4
Galangal Rhizomes	144.3	284.2
Psyllium Husk	330408.3	377411.2
Psyllium Seeds	19000.6	[illegible]
Senna Leaves & Pods	26666.0	8715.1
Tukmaria	114.9	89.3
Zedovery Roots	95.6	243.7
Opium Crude	249999.0	135124.3
Poppy Seeds/Husks	5051.1	845.3
Vinca Rosea Roots	2990.5	2740.8
Sarasaparilla	53.8	31.1
Crude Drugs n.e.s	55721.6	63681.3
Total	*579562.0*	*600541.5*
Deemed Exports	NA	NA
Total	5619713.6	5675110.1
Deemed Exports	72480.8	70056.5
Naphtha	834994.0	1518196.0
GRAND TOTAL	6527188.4	7263362.6

REMARKS:

ms are not separately codified by D.G.C.I. & S. Calcutta, for depicting export/import statistics.

rted from Kandla Free Trade Zone have been included in the above figures.

FOR MOST COMPETITIVE CIF OFFERS FOR:

UM TURPENTINE
ERCHLOROETHYLENE
DA ASH

DICHLONE
TOBIAS ACID
AND OTHER CHEMICALS

Please Contact:

M/s. K. SANGHVI & CO.

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BOMBAY 400 001
Telephone Nos. Office: 268970/268711 • Resi: 8128473/8226451
Telex No.: 11-73516 KSC IN
Telegram: KEYSANGHVI

IMPORT STATISTICS OF CHEMICALS AND ALLIED PRODUCTS

Item	April 83-March 84 Quantity (MT)	April 83-March 84 Value (Rs. lacs)	April 84-March 85 Quantity (MT)	April 84-March 85 Value (Rs. lacs)	April 85-March 8 Quantity (MT)	April 85-March 8 Valu (Rs. lac
1	2	3	4	5	6	7
ORGANIC CHEMICALS						
Accelerators for rubber	165.9	52.93	224.70	85.48	187.9	58.
Acetanilide	49.0	11.96	16.0	5.33	193.5	29.
Acetic acid	91.3	11.31	95.8	10.86	3590.0	239.
Acetic acid esters NES	1361.4	228.74	517.4	110.12	482.9	69.
Acetic anhydride	12.1	1.13	13.4	1.39	772.3	85.
Aceto acetanilide	43.5	9.62	43.1	8.22	26.0	6.
Aceto acetic ortho chloroanilide	1.0	0.35	--	--	--	
Aceto acetic para chloroanilide	3.4	0.76	0.3	0.23	0.5	0.
Acetophenone	--	--	51.0	3.52	8.0	0.
Acetone	481.1	52.46	7.2	0.69	103.9	22.
Acetylene black	2028.9	354.59	880.9	201.10	1207.6	293.
2-Acetyl amino-3-chloro anthraquinone	2.1	1.98	--	--	--	
Acrylonitrile	--	--	--	--	949.0	99.
Activated carbon	124.5	37.72	161.4	68.46	173.4	51.
Additives for minerals NES	10491.3	2215.79	7420.1	1891.02	5335.3	1299.
Adipic acid	299.9	36.92	348.2	44.22	182.7	31.
Alcohol acyclic NES	3939.5	245.85	2108.3	190.86	4364.4	386.
Alcohol cyclic NES	1146.9	134.72	361.2	72.51	1658.3	210.
Alkyl benzene NES	2032.7	152.58	2997.4	265.5	1168.5	931.
Alkyl phenols	25.3	2.52	--	--	15.6	1.
Alpha naphthol	1171.0	265.12	218.0	64.80	16.2	7.
Alpha naphthylamine	128.7	32.45	9.2	1.97	19.2	6.
Alpha picoline	129.6	15.82	3.5	1.58	8.6	2.7
Amine function compounds, NES	--	--	--	--	667.4	179.
Amino F acids	--	--	--	--	Neg.	0.1
Amino G acids	--	--	--	--	0.8	1.2
Amino anisic acid anilide	17.6	13.68	5.7	9.90	1.0	1.8
Amino acetic acid	3.0	3.72	10.2	2.62	11.3	14.1
Amino J acid	--	--	0.9	0.62	--	
Aminophylline	110.4	48.73	3.4	3.03	--	
2-Amino-1-phenol-4-sulphonic acid	6.2	10.41	1.0	3.80	--	
Aminopyridine	Neg.	Neg.	--	--	1.0	1.6
Amyl alcohol	311.0	24.35	102.7	13.41	804.0	86.8
Anisic aldehyde	14.6	16.43	6.4	7.36	27.3	15.3
Aniline	134.8	12.53	211.9	19.74	139.0	19.1
Anthraquinone	--	--	2.0	4.92	35.8	14.
Antioxidants	687.7	200.80	311.8	181.44	340.2	180.
Aromatic chemicals not exceeding 500 grams	469.6	496.85	1211.5	931.32	881.9	1054.1
1-Amino-2-naphthol-4-sulphonic acid	12.1	13.58	--	--	--	

1	2	3	4	5	6	7
mino R acid	24.5	20.21	--	--	--	--
Amino nitrophenol	30.6	16.93	18.4	10.08	2.4	2.19
mino compounds - others	770.8	495.84	1003.8	339.40	3492.3	761.22
nisole and derivatives	1.5	1.91	--	--	--	--
rsenic compounds	39.9	2.35	--	--	--	--
enzalchloride	23.0	5.45	--	--	--	--
enzaldehyde	279.4	53.30	506.3	109.20	263.0	176.60
enzene	100.9	5.77	663.9	68.35	2000.0	299.10
enzidine	--	--	1.0	0.83	0.5	0.43
enzoic acid	17.2	6.68	17.9	7.61	41.2	19.09
Benzyl acetate	4.2	1.36	--	--	--	--
Benzyl alcohol	0.5	0.54	194.2	39.44	10.2	1.85
Benzyl ethyl aniline	29.0	8.59	25.1	6.78	30.8	9.43
Beta naphthol	213.8	35.32	120.3	28.33	77.6	17.46
Butanol	2.5	3.76	224.2	24.19	89.9	15.08
Bornyl acetate	55.9	8.19	255.0	24.31	584.3	41.82
Butyl acetate	341.5	43.92	21.6	4.06	162.7	21.28
Butyl alcohol	139.6	18.37	239.7	52.19	494.6	84.54
Barbituric acid derivatives	--	--	5.0	4.15	--	--
Borneol	18.7	2.58	--	--	--	--
Butylene	5.0	0.67	8.0	1.28	19.3	4.02
Benzene sulphonic acid	26.9	2.18	--	--	2.9	0.24
Beta naphthol 1-sulphonic acid	12.5	1.89	--	--	--	--
Bronner's acid	Neg. •	0.04	0.3	0.19	--	--
Calcium gluconate	--	--	--	--	0.6	0.33
Calcium lactate	--	--	2.0	1.49	--	--
Camphor -- natural	--	--	--	--	0.5	1.23
Camphor -- synthetic	65.3	1.16	--	--	--	--
Carbozole	6.5	1.83	14.5	4.54	48.0	11.89
Carbolic acid commercial	3806.3	325.42	5106.2	501.91	5625.7	560.81
Carbolic acid pure	3290.5	293.52	4191.0	355.13	3576.1	300.10
Carboxylamide function compounds, others	--	--	--	--	2588.3	301.73
Carbon tetrachloride	278.7	13.16	--	--	--	--
Cetyl alcohol	220.6	30.0	290.6	39.75	147.7	23.79
Cinnamic alcohol	8.0	2.35	1.0	0.63	4.0	2.87
Cinnamic aldehyde	46.5	15.34	28.6	7.48	8.0	2.50
Citric acid	699.2	76.83	116.2	13.02	1854.1	236.72
Chlorobenzene	1.0	0.97	--	--	--	--
Chloroform	1129.2	60.34	69.0	4.61	144.8	10.99
Chlorofluoro methane	12.4	3.09	12.8	2.11	20.9	8.67
2-Chloro-4-toluidine-5-sulphonic acid	15.4	6.84	6.2	2.87	12.2	6.75
Cleves acid	3.2	1.57	8.4	3.23	17.2	6.62
2-Chloro-5-toluidine-4-sulphonic acid	28.5	10.01	73.1	32.23	58.7	27.16
Coumarin	85.0	84.61	47.0	55.52	5.0	7.42
Cresol NES	184.0	31.75	329.3	47.24	62.3	15.88
Cresylic acid commercial	10.4	1.41	389.8	54.26	60.0	7.74
Cresylic acid pure	1163.8	155.03	1138.9	162.13	962.9	145.90
Cyclohexylamine	424.0	51.63	246.5	29.88	341.2	58.16

1	2	3	4	5	6	7
Chicago acid	--	--	10.2	4.14	--	
Cyclohexane	188.8	18.29	161.3	16.38	156.4	17.
Citronellal	8.3	3.15	0.4	0.55	0.4	0.
Cobalt acetate	0.3	0.28	--	--	21.7	4.
Carboxylic acids and their halides	6448.5	752.90	6887.4	854.67	10019.9	1482.
Diazo azoxy compound	50.1	26.31	21.3	28.14	68.7	147.
Dibutyl phthalate	155.9	10.29	--	--	--	
Dichloroaniline	5.6	1.58	16.5	2.84	13.3	5.2
3:3 Dichlorobenzidine dihydrochloride	27.0	18.43	6.4	5.06	--	
2:5 Dichloronitrobenzene	24.5	2.57	44.0	7.64	14.0	2.5
2:6 Dichloro para nitroaniline	7.6	4.17	--	--	--	
Diethanolamine	418.8	37.07	0.5	0.45	122.3	12.2
Diethyl aniline	222.0	30.50	54.0	7.89	110.3	21.1
Diethyl meta toluidine	4.8	3.16	--	--	32.8	11.0
Diethylene glycol/ethylene glycol	2848.9	187.25	950.3	72.01	1680.5	117.3
Diethyl diphenyl urea	5.0	0.01	5.0	1.25	5.0	1.2
Diethyl sulphate	32.6	3.14	340.0	41.89	165.8	21.6
Dimethyl aniline	376.7	48.71	203.5	20.46	308.3	54.1
Dimethyl diphenyl urea	--	--	13.5	1.61	47.6	8.3
Dimethyl octanol	40.2	17.14	13.0	6.02	310.8	400.0
Dimethyl phthalate	12959.7	886.81	8332.4	495.19	1843.0	153.8
Dimethyl sulphate	26.9	4.10	4.7	1.02	10.5	2.1
Dinitrochlorobenzene	240.5	14.50	5.0	0.94	22.0	3.4
Dinitro toluene	10.2	2.51	0.5	0.36	1.2	1.0
Diphenyl amine	73.8	10.24	106.4	16.30	28.1	7.2
Dioctyl phthalate	1408.2	108.85	1026.9	78.04	127.2	11.2
Diphenyl methane	39.4	7.25	25.8	6.02	23.6	4.4
Diphenyl oxide	361.3	59.21	249.8	43.44	39.4	7.6
Dodecyl benzene	4051.4	308.17	247.8	23.27	1394.3	108.8
1:5 Dihydroxy naphthalene	0.4	0.87	3.6	4.99	0.5	0.6
1,4-Dihydroxy anthraquinone	0.5	1.07	--	--	--	--
2,4-Dihydroxy quinoline	14.3	21.17	28.5	31.59	12.9	12.02
2,5-Diethoxy aniline	--	--	1.0	0.94	--	--
2,5-Dimethoxy aniline	1.90	1.76	3.0	2.85	7.5	11.69
2,4-Dinitro anisole	--	--	--	--	3.0	0.35
Dioctyl ortho phthalate	56.8	4.73	--	--	--	--
Dihydro thiotoluidine sulphonic acid	1.6	1.70	7.0	5.52	6.0	5.86
2,5-Dichloro-4-sulphophenyl-1,3-methyl-5-pyrazolone	1.0	0.65	--	--	--	--
Diethyl toluidine	4.8	3.16	--	--	32.8	11.07
Epichlorohydrin	1476.3	220.27	1200.3	222.50	1427.8	268.53
Enzymes, others	0.2	0.59	--	--	--	--
Enzymes, industrial	11.2	20.29	10.8	8.65	518.3	109.48
Enzymes, pectolytic	492.8	94.12	154.5	64.76	140.7	118.80
Epsilon acid	18.0	7.40	14.8	4.70	0.5	0.39
Epsilon caprolactam	28332.0	3941.66	29881.4	5100.33	18045.2	3294.89
Epoxides, NES	356.0	47.70	1713.9	170.14	4482.7	677.41
Ester acetic acid derivatives, NES	1361.4	228.74	517.4	110.12	--	--
Ester monoacids, NES	1.0	0.14	--	--	--	--
Ether solvents	314.2	27.32	3.0	1.33	8.6	1.15
Ethyl acetate	17.1	2.08	1.4	0.64	80.3	9.21

1	2	3	4	5	6	7
hyl acetoacetate	95.0	13.75	106.4	16.98	33.2	5.77
thyl alcohol -- denatured	62.5	8.85	96.7	20.56	15134.1	777.15
thyl alcohol -- undenatured	13.5	2.38	--	--	--	--
thyl aniline	25.2	5.47	1.4	0.42	2.4	0.61
thyl benzene	--	--	1391.8	74.27	1832.7	90.88
thyl chloride	1.0	0.17	6.0	1.42	7381.3	171.27
thyl methyl ketone	3088.8	214.88	758.0	66.19	3257.7	288.07
Ethylene	38.3	8.70	3.2	1.35	205.7	15.32
Ethylene diamine	198.0	40.44	88.5	19.09	37.9	8.43
Ethylene dichloride	56185.8	1655.44	40181.2	1172.14	27623.1	742.10
Ethylene glycol	14297.0	814.93	5806.3	396.45	17544.8	1035.92
Ethylene oxide	0.1	0.05	--	--	--	--
Ethyl hydroxy ethyl aniline	4.9	1.18	0.2	0.24	1.0	0.50
Ethyl vanillin	--	--	--	--	2.5	4.37
Fatty alcohol, NES	2807.6	327.99	1441.1	182.89	10792.6	688.58
Food colours	3.8	2.85	Neg.	0.37	3.0	1.20
Formaldehyde	247.7	17.54	181.6	10.48	204.0	11.88
Formic acid	4412.7	235.25	3790.2	218.11	1781.1	109.52
Furfuryl alcohol	89.2	14.23	59.2	11.94	29.7	5.46
Furfural	3.8	0.53	6.6	1.17	3.2	1.07
Gallic acid	93.8	35.62	157.8	104.02	37.7	30.34
Gamma acid	0.4	0.16	46.0	28.18	25.6	16.95
Gamma picoline	141.5	35.33	251.9	79.20	253.9	93.02
Geraniol	10.5	5.26	15.2	7.77	28.3	15.19
Glycerine crude	1492.0	186.28	5156.7	722.54	303.9	68.96
Glycerine refined	1757.5	198.07	3058.7	538.54	1416.0	336.92
Glycerine, pharmaceutical grade	414.4	52.38	728.7	134.58	356.7	87.38
Glycerol monostearate	6.0	1.36	2.6	1.11	3.2	1.20
Glutamic acid	35.9	9.95	8.5	2.63	16.6	6.66
G. acid	2.5	0.55	--	--	--	--
H. acid	2.4	1.28	10.3	6.32	15.5	8.72
Halogenated hydrocarbons, NES	2821.20	501.20	300.2	28.64	258.4	50.96
Hydrocarbons, (acyclic) NES	62.0	11.50	18.5	14.35	22.4	8.99
Hydrocarbons, (cyclic) NES	456.0	53.02	2853.4	244.33	2523.7	280.66
Hydroquinone	116.3	34.40	99.4	39.42	69.3	24.12
Heliotropine	6.4	10.86	2.5	5.53	2.2	5.52
Hexamine excl. medicament	8.2	4.63	0.8	0.19	3.0	0.90
Hydrazine hydroxylamine devts.	--	--	1.0	0.66	--	--
4-Hydroxy-n-methyl-2-quinoline	10.3	14.23	2.7	4.34	10.5	14.32
8-Hydroxyquinoline and salts	142.4	113.52	96.2	88.40	102.5	116.74
Hexamethylene tetramine	8.2	4.63	0.8	0.19	3.0	0.90
Hydroxy dibenzofuron carboxylic acid	--	--	1.0	0.88	--	--
Imide/imine func. compounds NES	8.1	10.27	12.2	5.15	131.5	28.95
Indole	1.4	4.73	0.8	2.80	3.6	6.54
Isobutyl alcohol	483.1	34.01	681.3	46.19	864.2	69.17
Isocyanates & diisocyanates of hydrocarbons NES	422.2	75.04	484.2	90.37	678.8	129.40
Isoeugenol	Neg.	0.03	--	--	7.1	1.43
Isopropyl alcohol	698.4	63.27	1372.4	82.32	1091.1	99.48
J. acid	3.0	0.63	2.4	2.11	30.4	3.61
Ketone derivatives, others	--	--	--	--	418.0	106.78

1	2	3	4	5	6
Lactic acid	135.8	23.12	70.6	12.10	44.1
Lauryl alcohol	718.2	107.22	89.6	15.92	294.8
Laurents acid	0.6	0.50	--	--	--
Lecithins	528.5	32.03	640.2	51.79	173.3
Levulinic acid	44.1	2.85	15.0	1.25	17.7
Linalool	46.9	26.83	41.3	17.94	23.5
Linalyl acetate	8.6	5.42	4.5	2.92	36.9
Lactams, others	--	--	7961.1	1342.47	6523.2
Lysin	2.3	1.11	3.2	1.24	--
Maleic acid	153.9	27.64	176.1	24.10	295.5
Maleic anhydride	1262.6	108.39	332.7	38.39	752.8
Mannitol	179.3	45.25	111.1	18.09	219.9
Melamine	1050.6	116.02	315.8	28.15	5.3
Menthol	158.5	138.25	44.6	25.53	22.8
Meta amino phenol	3.0	5.35	--	--	--
Meta diethyl aminophenyl	21.8	14.45	29.6	26.72	3.6
Methionine and calcium salt	90.5	13.43	1.0	0.30	21.0
Meta nitrochlorobenzene	--	--	--	--	10.0
Meta phenylene diamine	219.4	91.73	98.7	31.74	83.5
Meta toluene diamine	30.5	6.17	40.8	9.25	28.0
Methacrylic acid esters	341.4	51.21	99.5	14.82	198.4
Methacrylic acid monomer	71.5	12.38	23.1	4.80	174.3
Methyl acetate	35.2	5.43	74.6	10.89	36.9
Methyl alcohol	43668.2	492.00	22337.7	438.86	24502.0
n-Methyl p-amino phenol sulphate	5.0	4.92	6.2	3.29	1.5
Methyl anthranilate	1.1	0.18	2.0	1.13	--
Methyl anthraquinone	--	--	--	--	4.0
Methyl benzoate	17.5	0.94	1.0	0.83	5.0
Methyl cellosolve	30.0	10.42	1.6	0.69	2.9
Methyl chloride	1918.8	105.30	1061.5	67.59	1080.5
Methyl ethyl ketone	3088.8	214.88	758.0	66.19	3257.7
Methyl isobutyl ketone	307.5	31.97	100.7	12.39	190.0
Methyl salicylate	2.0	0.40	--	--	--
Monocarboxylic acid NES	141.7	36.89	555.3	65.65	6322.9
Monochloro acetic acid	--	--	1.0	0.36	5.0
Monoethanolamine	235.7	20.24	2.0	1.14	573.7
Musk ambrette	28.7	27.90	3.9	3.06	2.21
Musk ketone	16.9	8.83	Neg.	0.02	0.4
Musk xylol	3.3	2.31	--	--	--
Malonic acid	12.2	11.81	15.3	18.21	18.0
Meta nitro aniline	2.0	0.32	--	--	--
Meta toluidine	8.5	4.38	13.8	2.44	--
Methacrylic acid esters	52.1	6.27	--	--	4.9
Methyl butadiene	15.0	7.77	--	--	4.0
n-Methyl taurine	6.1	1.74	--	--	2.3
2-Methyl quinoline	--	--	1.4	2.32	--
Naphthalene	690.7	40.63	--	--	--
Naphthionic acid	187.5	31.15	97.4	19.26	115.9
1:5 naphthylamine disulphonic acid	93.5	11.66	--	--	--
Naphthalene sulphonic acid	0.3	0.43	--	--	20.1
Naphthol sulphonic acid NES	2.6	0.63	--	--	--

1	2	3	4	5	6	7
itro-o-amino phenol-4-sulphonic cid	4.5	2.99	--	--	--	--
leic acid (other hetrocyclic ompounds)	311.2	106.96	552.9	197.63	421.5	204.61
rogen function compounds, others	--	--	678.0	207.1	5549.9	762.88
tanol	16394.9	1083.07	78.8	10.0	15.0	3.05
ic acid	16.7	1.62	44.3	4.75	5.5	0.75
yl alcohol	171.1	29.25	157.2	28.28	179.0	36.30
tho anisidine	36.1	14.32	67.9	23.94	10.8	4.42
rho chlorobenzaldehyde	0.3	0.16	--	--	0.5	0.16
ho chloro para nitro aniline	64.5	18.67	38.2	14.41	19.6	18.20
rtho phenetidine	--	--	--	--	2.0	0.79
rtho tolidine	12.0	1.53	21.0	2.61	3.4	0.41
Ortho nitro toluene	248.7	16.56	24.8	2.01	5.4	0.40
Octyl alcohol (2-ethyl hexanol)	16394.9	1083.07	78.8	10.00	14.9	3.05
Organo sulphur compounds, others	308.7	49.92	247.9	44.23	224.8	47.86
Oxalic acid	2.7	0.99	35.6	1.73	18.8	0.91
Ortho dichloro benzene	16.5	0.97	--	--	--	--
Ortho phenyl sulphonyl H. acid	--	--	1.0	0.38	--	--
Ortho toluidine	257.5	32.65	487.0	54.98	57.8	7.36
Ortho phospho amino lipids	41.2	4.01	74.0	19.24	--	--
-Octyl mercaptan	--	--	--	--	2.0	0.70
Organo/inorganic compounds, others	--	--	--	--	134.4	39.50
Organic chemicals, others NES	--	--	--	--	580.7	149.14
Organic compounds, others	--	--	--	--	105647.0	21053.60
Pancreatin pure	4.5	8.76	12.1	33.92	38.1	129.61
Persulphates	43.6	4.38	140.2	14.15	27.5	3.61
Paraldehyde	75.5	4.02	70.9	3.87	--	--
Para amino benzoic acid	2.9	3.85	3.0	3.84	15.8	2.93
ara amino phenol	67.6	25.61	21.4	28.08	0.5	0.80
Para chloro aniline	2.2	0.76	--	--	1.5	0.60
Para amino azo benzene	2.0	1.27	1.0	0.36	2.0	1.25
Para anisidine	30.0	11.15	13.1	4.88	--	--
Para cresol	99.5	18.23	129.9	25.00	117.7	27.30
Paracresidine	12.5	8.62	19.6	12.65	0.5	0.68
Para nitro aniline	13.9	5.22	--	--	--	--
Para nitro toluene	100.0	12.16	130.6	13.06	17.5	2.96
Para nitro chlorobenzene	1070.7	75.33	509.7	51.62	304.4	31.19
Para toluidine	51.8	11.03	32.0	9.87	10.0	2.16
Pentaerythritol	3625.6	411.41	1049.1	122.34	1102.1	114.10
Pectine esterase	0.5	0.38	--	--	1.0	0.59
Pepsin	18.2	19.55	6.7	10.18	9.7	12.73
Phenobarbitol	5.9	6.37	--	--	0.4	0.51
Phenol alcohol	258.0	23.11	122.6	15.29	1319.9	95.30
Phenol & phenyl alcohols, others	--	--	--	--	1051.4	150.78
Phenol derivatives, others	--	--	--	--	8291.0	855.31
Phenyl acetaldehyde	0.9	0.86	Neg.	0.04	--	--
Phenyl ethyl alcohol	3.0	1.99	--	--	--	--
Phenyl pyrazolone carboxylic acid ethyl ester	--	--	2.1	0.99	--	--

1	2	3	4	5	6	7
Phenyl beta naphthyl amine	--	--	7.7	4.31	--	
Phenyl methyl pyrazolone	--	--	1.5	3.21	--	
Phenyl J. acid	1.9	2.97	1.2	1.53	1.1	0.
Phenyl alpha naphthylamine	10.6	3.19	12.5	4.27	--	
Phenyl peri acid	11.9	4.53	2.1	2.47	--	
Phenyl phenols	91.3	10.01	114.6	11.91	214.4	23.
Phosphoric acids	226711.9	7585.54	585502.2	20415.22	1092844.0	31755.
Phosphoric esters, others	--	--	--	--	157.6	41.
Phospho amino lipins, others	--	--	--	--	58.0	7.
Phthalic acid	153.5	76.58	2360.0	232.15	3989.0	348.
Phthalic anhydride	3877.6	244.60	874.1	58.87	1234.7	88.
Plasticizers, NES	591.0	79.80	819.2	110.18	721.1	133.
Polyethylene glycol	112.6	20.01	192.2	31.11	64.3	17.
Potassium guaicol sulphonate	--	--	1.0	0.71	--	
Procaine hydrochloride	9.0	6.64	4.0	2.91	--	
Propylene glycol	5967.6	462.43	6797.7	576.76	3806.3	368.
Propanol	5.3	1.28	37.9	5.47	31.1	3.
Pyridine	183.1	83.05	158.6	75.50	175.3	89.
Papain pure	4.0	1.40	--	--	--	
Para acetyl amino phenol	8.2	3.29	--	--	--	
Para chloro aniline	2.2	0.76	--	--	1.5	0.
Para chloro toluene	10.6	1.58	37.2	7.50	71.4	16.
Propylene	2.0	0.54	2.5	1.35	86.4	8.
Propylene oxide	2.3	1.90	--	--	1.6	0.
Phenyl propyl acetate	45.3	3.71	--	--	--	
Poly carboxylic acid, others	3917.1	300.83	6747.3	644.47	5140.1	492.
Potassium bicarbonate	5.0	0.66	--	--	--	
Pheno barbitol sodium	0.3	0.31	--	--	--	
Quinoline	0.7	0.77	1.8	1.32	7.8	7
Resorcinol	87.0	34.18	26.6	10.15	41.2	17
Rhodinol	3.2	2.56	0.4	0.32	0.6	0
Rubber softener	16.9	1.98	10.1	1.48	20.0	7
Rubber chemicals NES	991.7	172.26	1175.5	254.87	412.1	191
S. Acid	37.4	16.24	7.7	3.54	2.0	0
Salicylic acid	43.0	12.04	32.09	8.52	42.0	9
Sodium alginate	318.0	102.48	24.3	10.17	22.4	8
Sodium naphthionate	0.5	0.27	--	--	--	
Sodium pentachlorophenate	14.2	2.92	13.2	3.60	5.0	1
Sorbitol	8403.3	371.61	287.9	14.94	503.6	30
Stearyl alcohol	165.4	22.35	34.7	5.59	105.1	18
Styrene	638.3	56.60	2096.2	203.37	6797.8	476
Sulphanilic acid	6.4	2.84	5.3	2.85	30.2	2
Sulphuric esters, salts and derivatives, others	--	--	--	--	955.8	138
Sodium compounds of mono acids NES	1891.0	67.57	1593.9	64.55	1156.1	4
Sodium acetate	5.0	0.66	0.4	0.15	--	
Stearic acid	--	--	4.5	0.49	236.2	1
Succinic acid	1.5	0.26	1.5	0.31	7.0	1
Sulphono nitro derivatives	13423.6	1076.06	--	--	4388.5	67
Sodium benzoate	1.6	0.19	--	--	--	

1	2	3	4	5	6	7
rontium oxalate	10.0	1.01	--	--	--	-
rtaric acid	1483.9	263.66	1009.1	167.36	1032.0	189.7
erpineol	157.6	32.77	94.9	18.27	137.3	19.8
erpineyl acetate	1.8	0.76	--	--	--	-
etrachloro ethylene	709.6	40.37	547.0	32.50	1257.4	80.3
hio urea	182.7	30.34	274.1	47.12	103.8	22.5
etra ethyl lead	304.2	67.6	1.0	0.34	68.6	16.7
hymol	48.2	30.39	25.4	16.11	6.8	4.8
obias acid	21.7	10.64	25.7	11.93	Neg.	Neg
richloroaniline	8.1	4.35	6.5	4.16	0.4	0.3
extile chemical auxiliaries NES	24.0	4.86	25.7	8.66	266.0	63.75
-Toluidine-3-sulphonic acid	9.3	3.61	--	--	5.0	1.31
Toluene diisocyanate	122.5	17.60	626.7	58.47	300.8	52.51
Trichloro acetic acid	0.4	0.35	--	--	--	--
Trichloroethylene	2908.6	152.70	322.8	19.75	1716.5	104.96
Trichlorophenol and its derivatives	15.8	8.83	18.8	399.00	3.4	2.56
Tricresyl phosphate	31.0	6.58	13.1	3.15	12.0	3.20
Triethanolamine	119.0	12.00	11.0	2.25	10.9	1.79
Trimethylene trinitroamine	34.1	9.13	7.3	1.84	--	--
Terephthalic acid, esters of	17332.6	1333.27	17047.3	1516.30	12933.6	1041.10
Trichloroethane	10.2	0.55	1.56	0.15	5.3	0.36
Titanium dioxide, others	--	--	--	--	944.4	175.99
Vanillin	66.5	58.95	38.6	38.91	88.2	104.80
Vinyl chloride	832.1	57.04	7099.3	485.90	12348.4	843.54
Vinyl acetate monomer	351.3	47.20	10.3	0.90	476.0	40.46
Water treatment chemicals	65.5	17.95	104.2	19.36	65.7	32.59
Wattle Extract	8961.1	766.31	8522.1	864.31	10406.8	1340.28
Xylene	7679.9	676.68	362.1	46.88	6163.9	582.68
Xylidine mixed	19.5	11.01	37.4	21.47	25.6	13.41
2,5-Xylidine	29.9	13.39	25.7	13.89	30.3	20.34
INORGANIC CHEMICALS						
Alkali metal NES	24.1	2.90	92.3	17.06	7.2	7.07
Aluminium chloride	30.9	16.49	2.7	2.14	14.4	3.90
Aluminium fluoride	1463.0	112.28	1327.0	133.12	13.4	0.79
Aluminium hydroxide	20.5	5.80	26.0	4.08	28.6	6.62
Ammonia (anhydrous)	259036.4	6214.4	269818.6	9080.35	260331.1	8162.42
Ammonia (aqueous)	48.8	3.37	--	--	5.0	0.90
Ammonium chloride	304.7	16.09	--	--	--	--
Ammonium sulphocyanide	12.0	1.28	--	--	--	--
Antimony oxide	119.9	32.84	109.1	38.43	123.4	51.40
Argon	--	3.94	--	2.46	--	4.48
Arsenic	--	3.96	51.2	15.97	48.0	8.76
Arsenic pentoxide	28.8	2.95	--	--	10.0	1.94
Arsenic trioxide	579.2	40.72	165.1	14.62	494.8	29.47
Aluminium sulphate (iron free)	1.0	0.10	--	--	--	--
Ammonium alum	2.0	0.19	5.3	0.55	--	--
Arsenic acids	6.4	2.03	6.5	3.12	1.8	0.88
Arsenic disulphide	18.0	1.32	--	--	--	--
Barium carbonate	8.8	0.66	380.1	22.76	5.3	3.12
Barium peroxide	7.9	3.08	1.5	0.65	1.4	0.79

1	2	3	4	5	6	7
Barium sulphate	10.1	1.01	Neg.	Neg.	11.5	1.0
Borates NES	72.9	3.05	21.3	21.11	10.0	3.3
Bromides/Oxybromides, others	--	--	--	--	1.7	1.2
Bromine	103.3	14.06	100.7	16.45	504.7	84.4
Boric acid other than natural	1.0	0.27	0.1	0.04	4.1	1.0
Boron	10.0	2.98	--	--	--	-
Boron carbide	0.7	2.46	4.0	4.64	1.5	4.7
Boric acid natural (crude)	6582.5	158.06	5820.0	154.58	5056.0	141.8
Barium chloride	0.5	0.51	7.0	0.72	32.0	3.6
Barium hydroxide	19.8	1.65	36.0	3.36	3.0	0.3
Bleaching powder	--	--	17.0	0.62	9.1	4.5
Borides	--	--	--	--	0.8	1.3
Calcium carbide	3719.2	211.47	1523.1	111.43	952.9	58.8
Calcium carbonate (synthetic)	394.6	12.36	1133.4	34.84	397.4	11.3
Calcium chloride	33.6	60.59	11.4	41.43	4.5	8.7
Calcium cyanamide	43.5	6.12	58.4	6.62	187.9	11.6
Calcium monobasic phosphate	--	--	--	--	1.6	0.5
Calcium dibasic phosphate	4.4	0.81	0.2	0.32	23.5	5.6
Calcium silicide	642.1	38.54	260.8	33.19	355.2	6.3
Calcium tribasic phosphate	299.6	18.05	--	--	--	-
Carbon black NES	1683.2	198.48	2027.1	250.09	4117.8	453.4
Carbon black for rubber industries	1860.9	145.69	1093.1	105.61	849.6	80.4
Carbon dioxide (liquid/solid)	0.2	0.17	257.6	280.03	0.8	0.5
Carbonates, NES	--	--	--	--	105.7	14.87
Catalysts, NES	--	1222.23	--	1451.89	--	1675.6
Catalyst platinium/palladium on activated carbon	--	402.42	--	581.54	--	197.8
Chloride/oxychlorides/hydroxy-chlorides, others	--	--	--	--	16377.1	294.6
Chromium oxide	0.3	0.20	1.0	0.13	13.5	4.5
Cobalt acetate	0.3	0.28	--	--	21.7	4.1
Cobalt oxide	3.9	4.47	3.1	3.92	7.4	15.1
Chlorine (compressed/liquified)	--	1.16	--	0.44	--	9.2
Cryolite artificial	710.3	33.88	--	--	--	--
Cuprous oxide	48.1	4.46	10.2	1.04	9.0	3.5
Copper sulphate	0.6	0.19	14.7	5.04	1.6	0.4
Cadmium sulphate	0.2	0.41	5.0	0.59	--	-
Cyanates	--	--	--	--	23.0	2.8
Double cyanide of sodium/potassium	1.6	0.50	33.0	6.20	75.1	21.2
Electroplating salts	7.5	3.35	15.7	6.34	1.2	1.3
Fluorine	--	--	--	--	35.0	0.6
Fluorides, others	104.8	14.13	57.2	13.84	61.5	16.4
Gilsonite	598.0	24.55	0.3	18.50	Neg.	6.5
Halides/oxyhalides, others	--	--	--	--	56.4	3.8
Helium	--	6.29	--	57.57	--	65.6
Hydrochloric acid	7.0	3.48	22.8	6.65	46.1	29.7
Hydrazine hydrate	451.8	88.05	132.9	30.11	180.5	42.6
Hydrazine anhydrous	19.0	2.30	--	--	--	-
Hydrogen	--	7.14	--	2.55	--	3.7
Hydrogen peroxide	2333.5	168.92	8025.5	666.65	909.5	72.9

1	2	3	4	5	6	7
ophosphoric acid	2.0	1.45	0.3	0.20	--	--
droxylamine sulphate	191.6	28.53	630.7	94.25	251.3	45.13
drofluoric acid	5.3	1.77	34.2	6.13	13.3	3.49
drophosphites NES	107.9	11.32	1.2	0.49	21.8	3.00
pobromites	--	--	8.0	5.38	--	--
pochlorites, others	--	--	--	--	376.6	90.25
rganic acids, others	--	--	--	--	467.0	92.29
rganic salts, others	--	--	--	--	10050.3	916.63
dine colloidal	--	29.97	--	22.83	--	31.11
dine excl. colloidal	426.9	514.59	443.0	545.50	347.0	538.11
on hydroxide	76.1	4.15	217.0	15.83	38.5	6.35
on oxide red (Persian Gulf)	1135.4	61.44	1575.1	104.73	1115.0	72.01
Kiselghur	15.2	0.91	8.1	0.66	23.0	2.03
Lithopone	320.1	15.10	317.0	15.29	350.8	20.57
Liquid air	4.9	4.06	59.9	12.83	Neg.	0.07
Lead oxides, others	11.9	2.94	72.3	6.88	42.6	10.75
Litharge	7.5	0.76	--	--	--	--
Magnesium carbonate (synthetic)	1.1	0.85	1.0	0.13	0.2	0.04
Magnesium chloride (excl. natural)	--	--	--	--	1.0	0.02
Magnesium peroxide/hydroxide	153.8	35.42	129.0	40.54	402.4	101.32
Manganese dioxide (electrolytic)	266.5	39.20	285.0	40.24	646.6	88.13
Manganese dioxide (excluding electrolytic)	215.6	43.67	36.8	4.59	192.0	17.17
Manganese oxide	29.0	3.76	112.4	7.79	70.3	14.57
Mercury	468.9	461.61	314.2	337.50	291.9	210.75
Metal carbides, NES	7.3	14.27	10.9	28.36	37.2	26.55
Molybdic acid	31.0	15.54	35.5	18.92	17.5	13.97
Magnesium thiosulphate	--	--	71.5	8.64	32.0	3.37
Magnesium oxide/peroxide	--	--	145.5	24.18	137.5	17.08
Mercury sulphate	1.1	1.29	--	--	--	--
Magnesium hydroxide	6.0	5.60	--	--	1.1	0.45
Mercury oxide	1.5	1.16	--	--	--	--
Nitrates, others	--	--	--	--	54.1	31.00
Nitric acid, fuming	--	--	1.5	0.31	5.0	1.31
Nitrous oxide	--	--	0.6	0.73	--	--
Nitric acid, diluted	--	--	--	--	6.0	1.23
Nitric acid, conc.	8.5	1.13	2.7	0.90	13.3	25.27
Nitrogen	--	0.07	--	1.63	--	2.96
Other inorganic compounds	2753.6	645.63	7386.3	818.30	2970.3	1082.69
Oxygen	--	0.76	--	23.99	--	0.46
Peroxides of sodium/potassium	3.4	1.00	0.6	0.97	1.2	1.82
Persulphates, NES	43.6	4.37	140.2	14.15	27.5	3.61
Phosgene	--	--	0.1	0.08	--	--
Phosphates, NES	328.8	76.21	47799.8	1344.82	143735.0	4934.97
Phosphites	42.6	9.89	--	--	86.1	20.25
Phosphoric acid	226712.0	7585.85	585502.1	20415.52	1092844.0	31755.76
Phosphorous pentoxide	123.4	12.42	1.6	0.53	1.3	0.53
Phosphorous black	--	--	--	--	10.5	4.23
Phosphorous red	6.8	1.90	5.4	1.62	9.9	4.31
Phosphorous white or yellow	0.1	0.22	89.5	20.22	200.6	35.29
Potash alum	1982.6	31.86	8357.9	98.99	4.0	0.25

1	2	3	4	5	6
Potassium bromide	--	--	18.3	2.70	
Potassium bicarbonate	--	--	--	--	1
Potassium carbonate	772.0	34.33	550.9	10.83	1301
Potassium chlorate	1116.9	53.68	837.1	58.90	2
Potassium cyanide	135.6	21.25	36.4	7.73	49
Potassium ferricyanide	18.0	3.46	51.5	12.43	5
Potassium ferrocyanide	35.1	4.56	142.2	19.24	70
Potassium hydroxide	101.6	10.05	310.1	37.66	295
Potassium silicates	206.5	10.62	348.2	15.57	1038
Potassium	--	--	10.0	0.98	53
Phosphides, others	218.4	33.69	0.6	1.20	40
Potassium nitrate	--	--	20.0	0.71	30
Potassium phosphate dibasic	--	--	0.5	0.19	
Precious metal compounds, others	--	--	--	--	8
Rare earth metals	1.9	3.32	12.7	5.57	55
Rare gases, others	--	2.15	--	49.35	
Red lead	--	--	--	--	0
Selenium	11.7	20.33	2.4	11.50	27
Silica gel	570.4	56.99	102.7	9.68	51
Silicates, NES	163.4	21.71	402.1	31.84	623
Silicon carbide pure	204.9	27.73	194.1	39.39	105
Silicone	1373.7	144.78	1385.9	227.77	2152
Silicides NES	27.4	5.54	34.0	6.20	139
Sodium aluminate	85.3	5.67	5.1	0.67	16
Sodium borate	19523.3	699.71	5493.4	278.49	4023
Sodium carbonate, dense	14111.0	162.63	499.6	7.19	43303
Sodium carbonate, light	13397.7	158.65	14930.4	171.84	112398
Sodium carbonate, others	--	--	57.7	0.99	14118
Sodium chlorate	281.4	54.65	1637.2	107.39	1
Sodium chloride	185.7	28.02	281.2	36.89	26
Sodium bisulphate	--	--	1.0	0.24	0
Sodium cyanide	1033.7	119.89	340.7	41.52	267
Sodium ferrocyanide	571.7	57.47	588.8	46.83	283
Sodium hydroxide	5713.0	201.53	2139.6	115.25	37871
Sodium hydroxide flakes	3870.6	122.46	1768.5	33.37	39756
Sodium hydroxide lye	43.0	13.09	76.5	6.13	5639
Sodium hydrosulphite	2953.5	295.06	782.4	77.28	
Sodium nitrate	2.6	0.12	--	0.22	
Sodium phosphate NES	533.9	32.50	13.8	4.92	51
Sodium silicate	129.9	7.30	67.3	6.23	94
Sodium sulphate	3634.2	106.34	65.2	101.6	32
Sodium tungstate	0.3	0.75	--	--	
Sulphoxylates	17.6	1.98	--	--	129
Sulphides, others	--	--	--	--	140
Sulphates, others	--	--	--	--	9
Sulphites/thiosulphates, others	--	--	--	--	676
Sulphates, others	--	--	--	--	1358
Sulphur oxychloride	1016.6	90.70	941.7	66.47	387
Sulphur sublimed	159.0	17.41	178.5	20.00	13
Sulphur excl. sublimed	998422.3	11257.70	1151089.5	20196.16	98366
Sulphuric acid	32.6	13.38	22.8	6.64	5

1	2	3	4	5	6	7
nds	48.0	13.35	0.2	0.99	--	--
	Neg.	0.13	--	--	--	--
	18.5	9.08	12.9	3.48	52.7	10.36
	116.8	4.12	192.8	6.55	833.1	31.78
de	0.8	0.49	1.5	0.96	5.0	0.33
te	23.2	3.43	12.9	0.99	119.0	7.77
onate	11.4	23.62	--	--	--	--
lphate	499.0	53.00	--	--	--	--
ide	--	--	48.0	4.07	75.0	3.30
sulphate	22.1	2.28	41.8	5.08	1664.8	125.78
ulphate	--	--	37.6	4.89	20.0	3.22
ly phosphate	1.4	0.16	682.0	40.74	17.0	1.84
nate	3.9	0.14	--	--	1.1	0.04
omate	18.0	1.48	105.5	8.41	48.3	4.00
ide	--	0.95	--	0.10	Neg.	0.02
olloidal	118.6	14.86	221.0	33.29	27.5	7.31
recipitated	26.0	3.25	15.0	1.86	58.5	8.90
	18.3	20.41	5.3	6.46	4.3	6.14
	1.5	0.30	--	--	0.6	4.93
oxide (anatase)	2923.4	304.59	3120.1	486.55	1493.8	269.48
oxide (rutile)	11520.4	1286.83	7253.7	1012.87	3793.4	706.87
ide NES	4886.2	551.24	2402.7	402.65	944.4	176.00
ead	--	--	0.9	0.34	68.6	16.70
hosphate	1.0	0.17	--	--	--	--
	--	--	--	0.53	Neg.	0.62
emically pure	14.1	2.15	19.0	4.01	0.5	0.03
	172.9	16.99	116.3	15.83	662.6	99.15
de	5.1	1.15	23.0	4.23	36.6	7.11
ides	--	--	8.1	0.71	--	--
te	0.5	0.10	0.3	0.06	--	--
CEUTICALS						
ylic acid medicaments	--	15.80	--	--	--	--
pe	--	1.38	--	3.21	--	1.27
NES	44.3	166.83	18.6	18.16	--	--
gestive preparations	--	2.05	--	14.87	--	--
reparations, others	--	326.44	--	75.14	--	408.72
serum NES	--	27.64	--	5.00	.	27.05
chloroquin and phosphate	12.73	48.71	51.4	142.48	32.0	101.45
s	--	0.57	--	--	--	--
alkaloids, derivatives, rations	--	--	--	--	--	0.23
phate	0.2	2.71	0.2	4.55	0.4	4.77
erivatives, others	--	681.87	--	267.05	--	125.25
drugs	--	0.46	--	0.38	--	0.26
& Unani medicines	--	4.66	--	1.26	--	3.17
ls -- Camoquin	0.3	0.75	--	--	--	--
PC	--	--	--	0.07	--	4.17
aze	--	4.28	--	0.04	--	0.45
ES	--	8.02	--	41.40	--	14.29
al products, others	--	27.74	--	134.15	--	78.58

1	2	3	4	5	6	
Botanical drug derivatives	--	--	--	--	--	35
Caffein, its salts and derivatives	84.8	46.11	8.3	5.78	10.0	10
Calcium PAS	1.5	1.81	0.1	0.16	--	
Chloramphenicol	--	6.92	--	2.05	--	15
Chloramphenicol derivatives	--	16.04	--	21.79	--	19
Chloroquin phosphate	12.7	48.71	51.4	142.48	32.0	101
Cinchona alkaloids, etc. quinine alkaloids	Neg.	0.88	--	--	--	
Cholines	3.3	2.63	16.6	6.17	--	
Contraceptive foam tablets	--	3.02	--	16.19	--	17.
Cotton wool	--	0.50	--	--	--	1.
Carbosone	0.4	0.48	--	--	--	
Codeine phosphate	--	--	--	--	27.0	147
Dental cement	--	3.77	--	6.03	--	8
Digoxin	Neg.	5.05	Neg.	0.11	14.1	5
Drug medicines chemical containing spirits NES	--	54.37	--	151.33	--	328
Dapsonium derivatives	--	0.48	--	--	--	7
Dehydrocholic acid	--	4.94	--	--	--	
Diphtheria serum	--	2.60	--	--	--	
Emetine alkaloids	--	--	0.5	1.53	--	
Ephedrine hydrochloride	36.7	103.17	32.2	101.40	11.2	38
Ephenephrine and salts	1.2	4.74	--	--	3.0	8
Ergotamine tartarate	Neg.	3.05	Neg.	1.34	Neg.	1
Erythromycin	--	166.71	--	54.72	--	38
Ephedrine alkaloids and derivatives	0.7	2.22	0.5	1.52	--	
Emetine alkaloids and derivatives	7.0	1.25	--	--	--	
Erythromycin and derivatives	--	44.79	--	74.37	--	20
Estradiol, its salts and derivatives	--	--	--	--	Neg.	0
Estrogens NES	Neg.	0.07	--	--	--	
Folic acid	0.6	7.19	2.0	2.92	--	
Gelatin and derivatives	10.8	8.27	14.7	11.09	15.3	6
Gelatin edible NES	27.8	34.12	10.9	10.75	3.1	4
Glycosides salts etc.	30.3	125.61	68.4	135.91	8.2	9.
Homeopathic medicines	--	135.47	--	103.63	--	175.
Hormones, others	4.2	110.31	0.3	12.76	Neg.	10
Hydrocortisone salt etc.	0.9	28.70	0.2	13.40	0.4	29.
Iodine colloidal	--	29.96	--	22.82	--	31.
Iodine tincture	--	16.83	--	8.37	--	17.
Insulin	Neg.	0.89	--	22.06	--	
Insulin preparations	--	61.15	--	--	--	0.
Iron ammonium citrate	Neg.	0.50	--	--	--	
Isonicotinic acid hydrazide	--	--	--	--	--	2.
Ichthamol	3.0	0.97	3.0	0.64	10.0	7.
Kaolin crude	--	0.37	61.2	2.49	49.1	3.
Laptasol	--	0.10	--	--	--	
Liver extract liquid	--	--	0.2	0.85	--	
Medicaments NES	--	10462.45	--	10926.33	--	14028.
Microbial culture	--	1.25	--	Neg.	--	0.
Mephenesin	--	13.07	--	0.24	--	
Medicinal castor oil	5.3	0.51	--	--	--	

1	2	3	4	5	6	7
edicinal concetraceptives, jeli etc.	--	--	--	--	--	0.02
erbromin NF	--	1.06	--	--	--	0.08
pium alkaloids NES	73.2	12.44	3.1	0.63	25.8	5.75
rgano therapeutic glands etc.	20.5	36.29	12.1	24.13	11.6	29.85
xytocin	0.9	38.17	1.6	3.78	0.6	2.43
ancreatin pure	4.5	8.76	12.1	33.92	38.1	129.61
ancreatin and pancreas	300.4	321.86	114.5	308.34	137.6	351.60
apavarine salt and derivatives	2.1	5.37	--	--	0.1	0.50
epsin	18.2	15.69	6.6	10.18	9.7	12.74
enicillin and derivatives	--	93.32	--	30.34	--	84.22
ethidin hydrochloride	--	0.51	--	0.52	--	0.23
hthalyl sulphathiazole	--	0.13	--	--	--	--
iturin injection	--	0.34	--	--	--	--
Progesterone	1.9	4.54	--	--	--	--
Proprietory medicines	--	124.90	--	188.92	--	264.27
Penicillin and preparations	--	25.33	--	3.67	--	39.71
Phenitoin sodium	--	6.35	--	2.46	--	1.52
Prednisolone	0.3	18.54	0.3	29.96	1.0	96.20
Plaster of Paris	--	0.71	--	0.94	--	6.41
Quinine sulphate	1.5	1.23	--	--	5.0	1.86
Sodium PAS	2.5	0.59	Neg.	0.44	--	--
Sterile laminaria, etc.	--	--	--	--	--	2.90
Sterile surgical catgut, etc.	--	14.57	--	49.10	--	62.52
Streptomycin and derivatives	--	32.47	--	0.59	--	--
Sulpha drugs, NES	14.7	46.98	3.1	12.35	33.6	12.12
Sulphadiazine	83.9	63.15	19.3	17.31	26.6	31.75
Sulphafurazol	0.3	0.27	--	--	--	--
Sulphamerazine	2.7	6.95	0.5	0.66	--	--
Salicylamide	--	--	2.5	1.50	--	--
Strychnine alkaloid	--	0.17	0.2	0.86	--	--
Sulphathiazole	8.5	4.86	--	--	3.4	2.42
Sulphanilamide	1.2	1.00	--	--	--	--
Tetanus serum	--	--	--	--	--	0.79
Theophylline theobromine alkaloid salts and derivatives	136.8	110.74	60.0	51.99	45.1	54.98
Tetracyclines and derivatives	--	109.59	--	53.52	--	16.25
Thiopentone sodium	0.2	10.02	--	--	--	7.55
Tubocurarin chloride	--	--	--	0.01	--	--
Testosterone propionate	0.2	18.69	--	--	--	--
Tetracycline preparations	--	20.23	--	--	--	--
Urea stilbamine	--	--	--	1.54	--	--
Vaccine NES	--	86.53	--	93.93	--	155.84
Vaccine polio	--	59.34	--	63.89	--	72.14
Vegetable alkaloids NES	44.3	166.83	18.6	18.10	1.6	5.36
Vitamin A	37.4	130.05	19.9	64.95	26.2	90.01
Vitamin B1	1.8	4.58	0.1	0.37	2.0	7.86
Vitamin B2	5.4	85.30	0.1	0.37	11.0	50.00
Vitamin B6	36.7	129.74	5.6	23.14	24.2	74.80
Vitamin B12	0.4	51.5	70.1	22.46	0.1	18.57
Vitamin D	0.5	1.89	2.0	4.54	56.8	47.66
Vitamin E	1.7	2.36	1.0	1.81	0.2	0.30

1	2	3	4	5	6	7
Vitamin K	0.5	0.84	--	--	--	
Vitamin P (rutin)	0.3	0.49	--	--	--	
Vitamin others	--	--	71.2	119.97	37.1	96.
Vitamin C	0.3	1.06	--	--	0.5	1.
DYESTUFFS						
Acid blue 2	0.2	0.29	--	--	--	
Acid blue 93	1.0	0.41	--	--	--	
Acid blue 127	1.3	1.98	0.3	0.61	2.4	5.
Acid blue 138	1.5	1.00	1.5	0.81	--	
Acid blue 140	0.3	0.50	0.6	1.75	--	
Acid blue azo	8.6	10.44	3.2	3.77	3.2	2.
Acid blue other non-azo	22.0	18.19	28.0	35.10	11.0	15.
Acid black azo	12.2	5.89	4.5	4.11	2.7	2.
Acid black NES	1.9	1.58	7.8	4.39	2.0	2.
Acid brown	6.8	4.48	0.8	0.83	4.3	3.
Acid brown azo	29.6	25.75	24.2	21.57	1.1	1.
Acid green azo	0.5	0.83	1.0	1.02	2.0	1.
Acid green NES	1.3	1.76	1.0	0.97	7.6	5.
Acid green 27	1.0	0.92	1.5	1.29	0.3	0.
Acid red azo	9.3	3.45	1.9	2.41	1.9	2.4
Acid red non-azo	2.0	1.26	1.0	0.48	0.7	0.6
Acid violet azo	9.4	0.29	2.3	2.45	0.4	0.3
Acid violet non-azo	2.4	4.91	1.0	3.85	1.1	3.6
Acid orange azo	4.2	2.34	2.1	2.28	0.3	0.6
Acid yellow other azo	4.6	3.36	1.6	1.96	5.5	3.8
Acid yellow non-azo	0.7	0.64	0.2	0.21	0.1	0.1
Acid yellow 36	37.5	30.64	6.2	6.30	14.9	2.7
Acid orange non-azo	--	--	1.0	0.93	Neg.	0.1
Azoic coupling component others	Neg.	0.07	0.1	0.60	--	
Azoic coupling component 48	14.3	12.25	2.8	2.36	8.1	7.2
Azoic diazo component 20	0.5	0.43	--	--	--	
Azoic diazo component 32	2.0	0.52	--	--	--	
Azoic diazo component others	0.8	0.75	--	--	0.5	0.4
Azoic diazo component 5	0.8	0.47	--	--	--	
Azoic diazo component 11	1.0	0.46	--	--	--	
Azoic browns	--	--	--	--	Neg.	0.3
Azoic black	--	--	Neg.	0.18	0.2	0.8
Basic azo dyes	0.1	0.15	--	--	--	
Basic black non-azo	17.5	7.58	1.2	1.64	0.7	1.4
Basic blue 16	9.0	13.32	1.4	2.74	0.2	0.4
Basic blue other non-azo	23.7	29.78	26.2	31.76	6.6	12.9
Basic green 4	2.0	1.67	--	--	--	
Basic red 1	4.8	7.79	2.8	5.76	2.1	4.7
Basic red others, non-azo	27.3	12.10	16.8	10.98	7.8	6.6
Basic orange non-azo	5.0	2.20	3.9	1.69	4.0	4.9
Basic violet 1	0.4	0.24	--	--	--	
Basic violet 14	--	--	0.2	0.27	--	
Basic violet others non-azo	38.3	17.94	23.2	7.08	2.8	1.7
Basic yellow 2	0.2	0.09	--	--	--	
Basic yellow others non-azo	51.5	28.93	3.1	3.46	13.9	7.8

1	2	3	4	5	6	7
asic violet 10	1.4	2.35	--	--	0.3	0.58
asic brown non-azo	18.2	8.81	8.4	7.49	--	--
olouring materials, others (veg/animal origin)	--	--	--	--	659.2	188.30
irect black non-azo	1.0	0.67	0.2	0.28	0.3	0.30
irect yellow others	--	--	--	--	4.0	4.82
Direct yellow 12	0.4	0.19	0.5	0.84	2.7	1.03
Direct yellow non-azo	0.5	1.36	2.0	1.72	--	--
Direct blue azo NES	1.1	0.79	2.5	1.37	5.1	4.29
Direct blue non-azo	--	--	0.3	0.76	1.3	0.88
Direct brown azo	Neg.	0.10	4.5	4.42	0.1	0.13
Direct green azo	Neg.	0.08	--	--	--	--
Direct orange azo	--	--	0.5	0.28	2.0	0.84
Direct red azo NES	2.5	3.06	0.4	0.40	--	--
Direct violet non-azo	1.2	0.49	--	--	--	--
Disperse blue others	27.0	32.17	111.5	68.65	117.3	116.25
Disperse black	7.0	4.61	19.4	15.18	17.4	15.05
Disperse black mixture	5.9	2.28	0.9	0.73	2.7	2.06
Disperse blue 1	3.5	4.19	0.4	1.11	0.1	0.40
Disperse blue 3	0.1	0.36	1.0	1.20	--	--
Disperse blue 14	--	--	0.2	0.27	--	--
Disperse brown	0.7	55.31	0.9	1.00	0.4	0.32
Disperse orange 11	--	--	0.5	0.34	--	--
Disperse orange others	3.5	4.20	20.6	10.67	15.7	6.27
Disperse red 3	0.2	0.40	0.5	0.81	8.0	10.29
Disperse red 4	0.2	0.26	--	--	0.4	1.20
Disperse red others	5.1	6.68	8.2	11.24	25.2	16.66
Disperse violet others	7.7	9.77	13.7	21.65	11.5	20.34
Disperse yellow 13	3.4	3.87	3.2	4.26	0.6	0.40
Disperse yellow other	21.8	19.78	21.7	19.67	27.1	30.37
Disperse violet 4	0.5	0.22	--	--	--	--
Disperse violet 8	0.4	0.43	--	--	--	--
Disperse brown mixture	--	--	1.2	1.25	--	--
Disperse greens	--	--	--	--	0.1	0.26
Disperse navy mixture	--	--	--	--	3.0	1.33
Disperse grey mixtue	--	--	0.3	0.42	2.1	0.54
Disperse violet 14	--	--	0.5	0.78	1.0	1.81
Dyes in forms or packing for retail sale	--	--	--	--	92.8	33.88
Fluorescent brightening agent	98.3	129.44	132.0	94.61	74.5	86.69
Food greens	--	--	--	--	1.0	0.88
Food yellow	--	--	--	--	0.7	0.71
Food yellow others	Neg.	0.13	0.1	0.77	0.2	0.08
Food blue NES	3.5	4.51	0.4	0.67	2.9	3.97
Food brown	0.2	0.39	--	--	--	--
Food blacks	Neg.	0.11	--	--	--	--
Ingrain dyes NES	14.0	5.18	0.5	0.45	8.9	4.92
Inorganic colouring materials NES	--	--	--	--	186.9	65.12
Inorganic pigments	--	--	--	--	689.6	138.38
Iron blues	--	--	--	--	25.5	4.00
Lakes	0.3	1.01	--	--	--	--

1	2	3	4	5	6
Mordant black	2.0	0.35	3.4	0.79	--
Mordant brown	10.5	2.45	--	--	--
Mordant yellow	4.4	2.52	--	--	--
Mordant blue	5.0	3.24	24.4	19.42	12.0
Mordant red others	4.0	1.80	--	--	--
Natural indigo	5.8	2.65	3.9	3.75	9.0
Organic dyestuffs, pigments/paste prepared	--	--	--	--	43.8
Pigment blacks org.	1.3	1.47	5.8	6.93	2.5
Pigment blue other org.	5.9	6.17	9.2	9.29	2.2
Pigment brown org.	Neg.	0.24	1.6	3.63	--
Pigment green 7	--	--	--	--	0.2
Pigment green other org.	0.4	0.60	Neg.	0.04	--
Pigment orange org.	1.8	2.75	0.9	1.02	Neg.
Pigment red other org.	9.0	13.87	3.7	4.86	6.1
Pigment red 3	0.6	0.58	0.9	0.81	--
Pigment yellow 1	1.7	2.68	1.2	1.93	1.4
Pigment yellow others	10.6	6.41	1.0	1.44	8.3
Pigment violet org.	3.7	11.36	5.5	20.82	5.4
Pigment blue 15	2.3	2.74	0.1	0.16	--
Reactive blue	5.2	4.29	1.2	0.73	3.5
Reactive orange	1.8	0.98	--	--	--
Reactive red	1.8	1.20	--	--	--
Reactive yellow	4.4	2.52	1.5	0.84	--
Solvent blue	2.7	5.53	1.7	4.06	2.4
Solvent green	0.3	2.72	2.1	1.63	2.1
Solvent browns	1.4	1.04	17.6	4.89	3.4
Solvent blacks	5.9	5.37	5.7	6.18	7.2
Solvent orange	0.8	1.12	0.6	1.35	0.9
Solvent reds	2.9	6.16	2.1	5.38	1.9
Solvent yellows	4.8	12.18	4.5	12.48	5.1
Solvent violets	Neg.	0.31	4.3	3.26	1.5
Sulphur black NES	116.3	21.65	248.0	60.56	16.0
Sulphur blue	38.8	16.57	19.9	8.22	51.7
Sulphur brown	21.2	7.57	30.1	16.52	16.7
Sulphur green	8.0	3.88	5.6	3.33	0.4
Sulphur yellow	22.7	4.56	632.5	108.20	66.8
Sulphur orange	2.0	0.25	--	--	1.3
Sulphur reds	5.9	3.35	--	--	15.0
Ultramarine blue	--	--	--	--	0.5
Vat blue 29	--	--	0.4	0.29	3.4
Vat black NES	3.1	5.89	1.7	6.06	1.9
Vat blue 1	17.4	18.45	7.0	5.45	8.9
Vat blue 6	0.9	0.98	--	--	Neg.
Vat blue 43	0.5	0.31	--	--	3.0
Vat blue others	6.8	14.27	10.1	9.68	12.7
Vat brown NES	Neg.	0.32	0.4	0.78	0.4
Vat green 1	--	--	--	--	Neg.
Vat green NES	0.5	0.37	--	--	2.0
Vat orange NES	0.3	0.39	0.8	1.23	2.3
Vat red 1	0.7	1.16	--	--	Neg.

1	2	3	4	5	6	7
d NES	2.9	4.67	0.5	1.21	1.5	3.03
olet 1	--	--	--	--	0.2	0.59
iolet NES	0.6	1.05	1.0	0.78	0.5	0.41
ellow 2	1.0	0.70	--	--	--	--
yellow	--	--	1.8	1.71	--	--
yellow NES	3.0	2.22	4.7	4.88	0.3	0.83
black solubilised	0.5	2.48	--	--	--	--
blue solubilised	0.1	0.42	0.1	0.53	0.2	0.72
brown 1	1.0	0.63	--	--	--	--
SINS						
ylic resins	170.7	17.32	237.4	27.95	416.0	51.10
ylic methacrylate primary form	1201.8	82.61	--	--	--	--
inic acid salt esters	31.3	8.77	49.9	9.91	1.9	1.95
yd or glyptal resin	434.3	44.97	76.1	18.93	748.4	70.85
yd resins others, primary form	1885.8	216.71	2634.2	277.45	19.7	14.72
yd plates/sheets	1542.5	394.52	554.0	266.11	688.8	327.37
yd polyesters	1885.8	216.70	13.9	7.10	487.3	77.47
inoplasts in primary form others	--	--	--	--	17.9	3.23
ificial colloidal graphite	594.2	56.99	--	--	539.2	101.27
lulose acetate flakes (plasticized)	27.9	2.71	71.8	3.90	--	--
lulose acetate moulding powder (non plasticized)	47.7	4.73	43.4	6.33	86.9	9.48
llulose acetate flakes (non-plasticized)	25.4	3.29	0.2	0.13	29.4	8.12
llulose acetate moulding powder (plasticized)	15.5	1.05	166.7	13.24	36.0	5.22
llulose acetate others, (non-platicized)	311.3	29.67	258.5	29.96	321.1	33.50
llulose acetate others, (plastucized)	490.5	42.10	768.8	56.79	1023.1	92.85
ellophane	31.9	6.81	55.9	5.52	237.7	20.04
ellulose aceto butyrate moulding powder	91.6	5.73	10.0	1.05	101.6	9.71
ellulose aceto butyrate moulding powder (plasticized)	--	--	--	--	105.0	8.25
elulose acetate or acetate butyrate heet/rod/tube (non-platicized)	276.5	63.90	283.4	57.01	216.5	51.91
llulose derivatives non-plasticized)	56.0	29.03	99.1	28.51	59.7	27.08
lulose derivatives (plasticized)	67.2	14.87	95.8	23.44	53.2	20.33
llulose nitrate (plasticized)	130.2	62.70	0.4	0.10	92.9	15.62
llulose nitrate others, non-plasticized)	--	--	--	--	11.4	6.33
ellulose plastic wastes	28.3	8.21	13.1	9.45	6.9	6.28
ellulose plastic wastes (non-plasticized)	--	--	--	--	16.5	14.03
ellulose nitrate and celluloid sheet/rod and tubes	26.6	19.80	65.1	54.73	58.1	60.00
ellulose nitrate (non-plasticized)	35.0	12.16	11.1	1.68	12.1	6.54

1	2	3	4	5	6
Coumarine indane resin	95.4	11.65	20.5	2.94	69.9
Epoxy resins	172.8	63.34	94.7	43.09	208.6
Epoxy resins, other primary forms	390.0	90.17	1050.7	245.89	2081.2
Epoxy resins, other forms	29.9	11.60	25.5	10.14	11.9
Ethyl cellulose (plasticized)	--	--	--	--	3.5
Ethyl cellulose (non-plasticized)	194.3	35.57	38.3	27.13	28.6
Hardened proteins	1.6	0.91	33.1	3.86	6.5
Heparin	1258.9	119.97	2359.9	237.56	1929.1
Indane resins other primary forms	1982.9	321.90	--	--	2141.2
Linoxyn	Neg.	0.12	15.9	1.86	--
Maleic resins	3.1	0.66	--	--	--
Melamine formaldehyde resins	17.7	3.66	5.3	1.12	16.8
Methyl cellulose (plasticized)	--	--	--	--	4.9
Methyl cellulose (non-plasticized)	58.6	11.40	17.9	11.03	5.8
Nylon primary form excluding textile fibre	25.9	7.06	22.9	10.03	5.7
Nylon moulding powder	583.2	115.54	192.7	34.48	390.3
Phenol formaldehyde moulding powder	329.1	27.77	602.1	93.91	526.7
Phenol formaldehyde resin	10.2	2.29	753.1	10.44	119.1
Phenolic resins NES	53.3	75.78	27.4	7.59	46.6
Phenoplasts in primary forms others	--	--	--	--	763.3
Plastic materials NES	5340.2	1670.67	9286.6	1554.62	9594.9
Polyacrylate moulding powder	235.2	25.60	12.5	4.40	293.8
Polyacrylate sheets	312.5	18.80	82.6	9.09	617.1
Polyamides, others	126.5	24.22	68.8	26.22	139.1
Polyethylene resin compound (high pressure, low density)	1563.2	190.81	18404.8	1373.90	39505.4
Polyethylene resin compound (low pressure, high density)	42987.8	3559.7	55923.1	5163.24	110154.4
Polyethylene other primary forms	4103.8	371.47	4682.7	494.45	4620.8
Polyethylene other forms	83.8	20.78	288.1	26.58	1080.2
Polyethylene sheets	71.7	12.51	77.7	8.27	486.5
Polyethylene rods and tubes	19.6	7.70	Neg.	Neg.	10.0
Polyethylene waste and scraps	208.1	20.74	140.2	15.44	187.5
Polyethylene methacrylate moulding powder	43.6	4.43	107.9	11.41	--
Polymethyl methacrylate sheet/rod etc.	162.6	20.37	273.3	21.64	454.0
Polymethyl methacrylate, other primary forms	--	--	--	--	4267.8
Polymethyl methacrylate plates/strip/film/foil	--	--	--	--	584.3
Polymethyl methacrylate waste/scrap	--	--	--	--	1571.8
Polypropylene	226.4	185.60	5745.1	573.98	6003.7
Polypropylene primary form	2264.0	207.96	4342.6	421.83	6892.5
Polypropylene sheet/film/foil and strip	990.9	192.28	1187.2	228.67	4265.2
Polypropylene other form	5254.5	580.14	3804.7	403.41	5641.8
Polyester or contact resins	--	--	62.0	12.74	256.4

1	2	3	4	5	6	7
ne moulding powder	2341.9	197.32	1986.8	207.67	7902.3	754.74
ne and its copolymer, ry forms NES	3409.2	314.91	968.2	86.50	4398.8	432.24
ene scraps/wastes	275.8	25.20	3533.1	473.85	13433.6	1475.76
ene sheet/film/foil or strip	385.6	84.49	211.5	137.19	650.7	217.30
hanes in primary form	24.2	12.94	129.5	28.94	67.1	15.54
hanes other forms	71.8	20.40	242.7	42.76	42.2	21.29
yl acetate moulding rials	31.8	6.91	12.4	4.27	160.2	18.67
yl acetate sheets/rods	4702.8	568.68	Neg.	0.03	39.4	2.64
yl acetate waste/scrap	--	--	1.1	0.63	68.2	5.98
yl acetate resins	794.8	121.29	255.0	47.10	776.3	90.31
yl acetate primary forms	3812.4	428.72	1871.6	298.67	4406.5	326.96
yl chloride compound	6307.1	376.56	2647.1	206.39	3173.9	233.75
yl chloride resins mulsion	10714.9	675.02	6039.1	405.86	4121.2	280.46
lates etc.	1100.5	154.80	444.3	86.11	2205.2	199.72
rimary form NES	16862.5	1074.03	6629.2	472.63	7115.1	522.34
esin by suspension	82317.3	4769.02	80192.9	5407.44	75342.2	5200.7
waste/scrap	1.0	0.74	Neg.	0.07	40.3	3.08
, chemically treated	860.7	75.01	206.4	34.31	885.9	70.05
, others	--	--	--	--	1228.8	126.34
es	256.0	93.20	96.2	42.06	36.8	17.14
e, others	--	--	--	--	850.0	290.31
m alginate	312.9	102.48	24.3	10.18	22.4	8.07
formaldehyde moulding wder	0.8	0.30	25.7	2.87	62.0	6.45
plastic film/sheet/ribbon	139.0	33.66	78.5	40.02	257.9	61.38
plastic rod/tube/filament	100.0	7.43	4.5	2.09	6.1	2.26
nyl derivatives	63.6	17.84	49.7	19.78	19.7	9.99
nised fibre	--	--	--	--	73.6	24.78
URAL RESIN AND WOOD BASED CHEMICAL PRODUCTS						
dry core binder (natural resin duct)	6110.5	318.85	--	--	32.2	7.25
rosin	3673.2	183.55	3847.1	213.24	7247.0	425.39
n others	313.2	23.60	1105.1	16.33	124.3	8.07
n acid and derivatives excl. gum/rosin spirit/rosin oil	4.9	0.89	20.2	2.90	--	--
of turpentine etc., others	166.6	8.81	543.7	33.57	282.9	19.42
te lye concentrated, others	2.3	0.91	22.2	3.03	2.0	0.64
tar	--	--	45.1	8.04	--	--
tar oil (creosote naphtha ylene oil)	0.6	0.43	5.2	1.04	0.8	0.25
n sulphonates	1745.0	87.93	117.0	15.43	--	--
ICIDES						
n	359.5	259.32	339.2	209.11	195.7	141.46
lane	25.0	11.17	24.0	11.62	24.4	12.20
	--	--	--	--	3719.8	[illegible]
preparation	457.0	40.52	4623.5	497.80	737.6	[illegible]

1	2	3	4	5	6
DDVP	49.0	16.95	78.3	21.85	19.2
Disinfectants	1.0	0.20	1.0	1.61	--
Fungicides, others	249.9	126.66	414.8	148.74	292.3
Heptachlor	--	--	10.0	5.44	13.7
Methyl bromide	46.2	11.79	2.4	0.57	11.5
Parathion methyl	51.8	10.61	366.6	74.82	104.5
Pesticides NES	347.1	202.36	43.1	32.31	430.2
Other weedicides and weed-killing agents	55.7	46.72	8.1	3.93	Neg.
Insecticides, others	5590.7	3219.49	3418.9	1861.65	2557.5
Aluminium phosphide	16.9	23.71	--	--	--
Maneb	12.0	4.65	--	--	--
Shirlan paste	--	--	93.8	21.29	--
Sodium penta chlorophenate	14.3	3.91	13.2	3.60	5.0
Thiram	1.2	1.59	24.0	3.06	--
Zineb	32.1	2.84	--	--	--
ESSENTIAL OILS					
Anise oil	3.3	4.06	2.5	3.15	5.3
Bergamot oil	16.8	19.37	12.4	13.87	5.1
Cajuput oil	1.0	0.45	--	--	0.1
Camphos oil	0.4	0.25	Neg.	0.21	--
Caraway oil	Neg.	0.05	Neg.	0.31	--
Canaga oil	1.0	1.00	2.0	2.09	0.6
Cinnamon bark oil	2.8	0.73	1.5	0.71	1.2
Cinnamon leaf oil	3.8	2.57	7.9	5.20	6.5
Clove oil	82.6	34.95	83.8	49.01	241.4
Coriander seed oil	Neg.	0.04	Neg.	0.27	0.2
Essential oil NES	147.7	137.60	353.7	1078.13	262.3
Dill oil	--	--	1.0	0.33	--
Essential oil, synthetic	23.9	46.20	3.7	3.74	3.4
Essential oil others (conc.)	41.7	103.6	17.1	20.78	24.2
Essential oil mixture as perfume base	--	--	--	--	49.8
Ceranium oil	27.0	56.39	17.9	32.81	6.6
Ginger oil	3.6	2.72	--	--	--
Lavender oil	27.0	30.73	28.6	25.75	13.3
Lemon oil	24.5	18.00	14.4	9.54	26.7
Nugmet oil	7.5	4.15	5.9	3.82	6.0
Oil of spice NES	0.3	0.96	9.8	7.08	1.6
Orange oil	249.2	23.74	138.2	22.72	222.1
Patchouli oil	32.9	42.85	71.1	105.69	214.6
Peppermint oil ex-mentha arvensis	84.9	84.80	8.8	15.05	7.1
Peppermint oil ex-piperita	29.3	38.27	7.7	9.18	22.2
Peppermint oil dementholised	--	--	2.7	2.40	--
Petigrain oil	1.2	1.98	4.4	3.21	5.1
Resinoids	36.8	44.26	48.2	48.92	40.5
Rosa oil	6.9	3.62	6.1	2.93	2.6
Sandal wood oil	2.0	3.43	--	--	--
Spearmint oils	0.6	1.23	5.6	11.0	2.0
Ylang Ylang oil	3.0	5.17	2.6	6.31	2.1
Pepper oil	--	--	1.0	1.81	--

1	2	3	4	5	6	7
IES						
egg	1.8	1.10	1.6	0.92	0.5	0.38
, others	9.1	12.26	25.6	8.79	32.2	22.34
te. others	56.5	29.60	71.8	23.98	93.9	51.46
lerivatives, others	10.8	8.27	14.7	11.09	15.3	6.65
dible, NES	27.8	34.12	10.9	10.75	3.1	4.38
c. others	--	--	107.4	38.38	163.4	48.43
ssein	20.5	6.30	40.9	9.94	62.7	15.84
ES (prepared)	54.7	35.40	43.6	27.25	41.8	237.62
uitable as glue NES	14.6	10.23	46.9	32.54	27.2	22.42
rived from bone etc.	--	--	--	--	0.5	0.23
insulin (others)	37.8	7.39	55.8	11.95	39.8	10.13
e glue with l/urea/cresol	4.2	3.61	4.5	4.10	5.6	2.38
starches	--	--	--	--	2.2	0.78
luten others	38.6	11.08	56.1	12.66	--	--
s	0.3	0.50	0.8	1.30	--	--
	14.0	7.66	0.8	0.32	--	--
others, derivatve subs.	16.7	6.52	39.5	22.25	--	--
substances derivatives	--	--	--	--	29.7	18.21
s	--	--	2.0	0.10	17.7	1.35
LLANEOUS CHEMICAL PRODUCTS						
enated castor oil	--	--	--	--	8.2	1.19
ed diatomatically bauxite other activated mineral	4108.0	203.10	3897.7	233.80	5696.6	241.52
media for development of organisms	0.4	0.19	1.2	0.72	0.1	0.03
for printing	4.3	1.48	9.1	2.44	127.4	14.08
ate solvents, etc.						
ers, NES	37.0	32.86	58.7	17.40	158.7	47.17
uid	30.8	16.35	12.5	4.21	31.7	14.38
ants NES	--	--	244.0	20.24	1.3	1.32
emicals	69.2	25.32	17.7	19.23	90.7	45.38
	2.8	0.34	Neg.	Neg.	2.0	0.53
nsfer salts	126.1	28.27	57.1	12.56	233.0	51.85
e of diphenyl and diphenyl e	480.9	109.34	272.9	61.33	259.8	73.58
ing agents	38.6	5.49	16.9	3.39	13.3	2.88
lphate formaldehyde ound	1350.7	163.89	351.1	37.29	101.4	15.14
tension reducing agents	8.0	1.97	0.1	0.07	Neg.	0.03
de	--	--	--	--	197.0	13.87
ed soaps	--	--	--	--	0.1	0.23
g out agents	--	--	--	--	1.3	1.87
e acting agents, NES	--	--	--	--	4977.1	909.52
nting agents	--	--	--	--	73.9	20.25

1	2	3	4	5	6	
Other chemical products NES	18720.6	3427.43	17952.0	3622.54	31568.5	56
FERTILIZERS	**'000 t.**		**'000 t.**		**'000 t.**	
Ammonium nitrate	--	--	11.0	165.90	--	
Ammonium sulphate	--	--	82.9	1425.02	65.0	16
Potassium chloride comm.	490.5	4397.31	644.9	8869.24	720.0	96
Phosphatic fertilizers NES	1113.2	20660.07	529.2	12416.47	580.3	141
Potassium chloride pure	104.8	1090.38	71.0	980.71	244.2	33
Potassium fertilizers NES	701.9	6719.99	297.3	4174.84	125.3	17
Potassium sulphate containing not more than 52% K_2O	10.5	213.01	17.3	425.40	Neg.	
Superphosphate	--	--	0.6	15.29	--	
Urea	615.8	9501.6	2997.8	64246.29	2808.5	605
Fertilizers NP NES	4.0	45.33	90.6	2120.10	210.0	51
Other fertilisers NES	86.1	2098.41	249.8	5843.49	418.5	89

(Source: Monthly statistics of the Foreign Trade of India, Vol. II -- Imports, March 1984, 1985, 1986.

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The Customs Duty structure is a three tier system comprising a basic duty, an additional duty and an auxiliary duty. In this section we have tried to give a fair idea of the prevailing duty rates in respect of many relevant items. We have made an attempt to incorporate latest amendments, changes noted upto March 1988. Suggestions/comments from our readers regarding any errors that may have crept in a compilation of this nature, shall be most welcome in our endeavour to provide more information.

Import Tariffs

me of the Product	Basic Duty	Remarks
HEMICAL ELEMENTS		
lorine	100% plus Rs. 25/kg.	
dine	-do-	
dine (in crude form)	70% ad valorem	If imported for purpose of iodisation of salt then (i) Duty 25% ad valorem (ii) no additional duty.
uorine, Bromine	100% plus Rs. 25/kg.	
lphur, sublimed or precipitated; colloidal sulphur	-do-	Insoluble sulphur: 60% ad valorem.
rbon black	70% ad valorem	If imported for manufacture of printing inks then duty 55% ad valorem. If used for potentiometers, switches and magnetic tapes duty is 30% ad valorem.
ydrogen	100% plus Rs. 25/kg	
rgon	-do-	
itrogen	-do-	
xygen	-do-	
oron: tellurium	-do-	
licon	50% ad valorem	If imported for purpose of solar cells, or solar cell modules, (i) rate 30% ad valorem and (ii) no additional duty.
hosphorous	100% plus Rs.25/kg.	
rsenic	100% ad valorem	
elenium	-do-	If purity is >99.99% and used for selenum rectifiers then (i) duty 30% ad valorem and (ii) no additional duty.
odium	100% plus Rs. 25/kg.	
alcium	-do-	
trontium & barium	-do-	
are-earth metal, scandium and yttrium whether or not intermixed or interalloyed	-do-	
ercury (excluding AR/BP/USP in ontainers holding 500 gms. or less)	60% ad valorem	
ercury (in other specifications)	100% plus Rs. 25/kg.	
norganic Chemicals		
ydrochloric acid+	-do-	
hlorosulphuric acid	-do-	

Name of the Product	Basic Duty	Remarks
Sulphuric acid+	100% plus Rs. 25/kg.	
Nitric acid+	-do-	
Diphosphorus pentoxide	-do-	
Phosphoric acid+	-do-	If imported for the purpose of manufacture of lizers rate is 15% ad valorem.
Boric acid	70% ad valorem	
Hydrofluoric acid+	100% plus Rs. 25/kg.	
Other acids not specified	-do-	
Carbon dioxide	-do-	
Silicon dioxide	-do-	
Sulphur dioxide	-do-	
Chlorides & chloride oxides	-do-	
Carbon disulphide	-do-	
Anhydrous ammonia	70% ad valorem	If imported for manufacture of fertilisers then No duty and (ii) no additional duty.
Ammonia in aqueous solution	100% plus Rs. 25/kg.	
Caustic soda (solid)	Rs. 3,500 per tonne	Exempted from additional duty.
Caustic soda in aqueous solution (soda lye/liquid soda)	Rs. 3,500 per tonne on basis of weight of sodium hydroxide (excluding weight of aqueous medium)	Exempted from additional duty.
Potassium hydroxide	70% ad valorem	
Sodium peroxide	100% plus Rs. 25/kg.	
Potassium peroxide	-do-	
Magnesium hydroxide/peroxide	-do-	
Strontium oxide/hydroxide/peroxide	-do-	
Barium oxide/hydroxide/peroxide*	-do-	
Zinc oxide/peroxide	-do-	
Artificial corundam	70% ad valorem	
Other aluminium oxides	70% ad valorem	30% ad valorem if used for electronic valves, and ceramic capacitors.
Aluminium hydroxide	100% plus Rs. 25/kg.	
Chromium trioxide	-do-	
Manganese dioxide*	-do-	Battery grade, rate of duty is 70% ad valorem.
Iron oxide/hydroxide	-do-	
Earth colours	-do-	
Cobalt oxide	70% ad valorem	
Cobalt hydroxide	100% plus Rs. 25/kg.	
Titanium oxides	-do-	30% ad valorem if used for making piezoelectr elements.
Titanium dioxide	70% ad valorem	30% ad valorem if used for making potentiome No additional duty is leviable.
Lead monoxide	100% Rs. 25/kg.	
Red/Orange lead	-do-	
Hydrazine & hydroxylamine	-do-	
Lithium oxide/hydroxide	-do-	
Vanadium oxide/hydroxide	-do-	
Nickel oxide*/hydroxides	-do-	
Copper oxide/hydroxides	-do-	
Germanium dioxide+	-do-	

of the Product	Basic Duty	Remarks
nium oxide/Zirconium dioxide	100% plus Rs. 25/kg.	
denum oxide	55% ad valorem	35% ad valorem duty if imported for use in manufacture of ferro alloys.
denum hydroxide	100% plus Rs. 25/kg.	
ony oxide	-do-	
nium^{+}/sodium fluoride	-do-	
nium fluoride	-do-	
r fluorides	-do-	
osilicates of sodium/potassium	-do-	
hetic creolite 70% ad valorem		
nonium chloride	100% plus Rs. 25/kg.	
ium chloride	-do-	
nesium chloride	-do-	
minium chloride	-do-	
chloride	-do-	
alt chloride	-do-	
kel chloride	-do-	
c chloride	-do-	
chloride	-do-	
ium chloride	-do-	
ers	-do-	
pper chloride oxide	-do-	
dium bromide	-do-	
assium bromide	-do-	
er bromides	-do-	
lcium/other hypochlorite	-do-	
pobromites	-do-	
dium chlorate	-do-	
her chlorates	-do-	
omates/Perbromates	-do-	
dium sulphide	-do-	
nc sulphide	-do-	
dmium sulphide	70% ad valorem	
hers	100% plus Rs. 25/kg.	
dium dithionites/sulphoxylates	-do-	
her dithionites/sulphoxylates	-do-	
dium sulphites	-do-	
dium hydrosulphite	60% plus Rs. 5/kg.	
her sulphites	100% plus Rs. 25/kg.	
iosulphates	-do-	
odium sulphates	-do-	
her sodium sulphates	-do-	
gnesium sulphate	-do-	
uminium sulphate	-do-	If imported from UAR and Yugoslavia rate is 50% of table rate.
hromium sulphate	-do-	
ckel sulphate	-do-	30% ad valorem if used for semiconductors.
opper sulphate	-do-	
nc sulphate	-do-	
arium sulphate	-do-	
errous sulphate	70% ad valorem	

Name of the Product	Basic Duty	Remarks
Other sulphates	100% plus Rs. 25/kg.	
Alums	70% ad valorem	If imported from UAR and Yugoslavia rate cable is 50% of table rate.
+Peroxo sulphates (persulphates)	100% plus Rs. 25/kg.	-do- (+ only ammonium persulphate)
Nitrites	-do-	
Potassium nitrate	-do-	
Bismuth nitrate	-do-	
Other nitrates	-do-	
Phosphinates (hypophosphites) and phosphonates (phosphites)	-do-	
Triammonium phosphate	-do-	
Mono- or di-sodium phosphate	-do-	
Trisodium phosphate	-do-	
Potassium phosphate	-do-	
Dicalcium phosphate	-do-	
Other calcium phosphates	-do-	
Other phosphates	-do-	
Sodium triphosphate (tripoly-phosphate)	-do-	
Other polyphosphates	-do-	
Ammonium carbonate	-do-	
Disodium carbonate (soda ash)	70% ad valorem; 25% ad valorem upto 31.3.89	For soda ash import from Burma; rate applic 5% ad valorem.
Sodium bicarbonate	70% ad valorem	
Potassium carbonates	-do-	
Calcium carbonate	100% plus Rs. 25/kg.	
Barium carbonate#	-do-	
Lead carbonate	-do-	
Lithium carbonate	-do-	When imported for the purpose of energy sa and pollution control in the manufacture of A any organisation manufacturing Al. (a) duty i 25% ad valorem; (b) no additional duty is le
Strontium carbonate#	-do-	
Bismuth carbonate	-do-	
Other carbonates	-do-	# Only magnesium carbonate
Sodium cyanide	70% ad valorem	
Other cyanides	100% plus Rs. 25/kg.	
Complex cyanides	-do-	
Sodium metasilicates	70% ad valorem	
Other sodium metasilicates	-do-	
Potassium silicates	-do-	
Other silicates	100% plus Rs. 25/kg.	
Anhydrous disodium tetraborate	-do-	* Refined Borax
Other sodium tetraborates	-do-	* Boric acid
Other borates	-do-	
Perborates (Peroxoborates)	-do-	
Aluminates	-do-	
Zinc chromates	-do-	
Lead chromates	-do-	
Sodium dichromate	-do-	

f the Product	Basic Duty	Remarks
um dichromate	100% plus Rs. 25/kg.	
chromates/dichromates	-do-	
nites, manganates & manganates	-do-	
dates	-do-	
ates (Wolframates)	-do-	
lex silicates	-do-	
dal precious metal	-do-	
nitrate	-do-	
compounds	-do-	
compounds	-do-	
gams	-do-	
gen peroxide+	-do-	
er phosphite	-do-	
phosphides	-do-	Gallium phosphide for semiconductor devices will be allowed at 30% ad valorem.
um carbide	70% ad valorem	
n carbide	-do-	
r carbides	-do-	
ides/nitrides/azides/silicides/rides	-do-	
r inorganic compounds	100% plus Rs. 25kg.	

cates (i) Rate of duty 30% and (ii) No additional duty, if it is imported for the purpose of manufacture of semiconductor devices.
cates (i) Rate of duty 30% and (ii) No additional duty, if it is imported for manufacture of ferrides.
cates (i) Rate of duty 30% and (ii) No additional duty, if it is imported for manufacture of ceramic capacitors.

ANIC CHEMICALS

rated acyclic hydrocarbons	100% plus Rs. 25/kg.	
ene	-do-	
ylene	-do-	
lene and isomers	-do-	
-1,3-diene and isoprene	-do-	
r unsaturated acyclic drocarbons	-do-	Di-isobutylene, heptene, nonene, hexene and mixed hexenes can be imported for manufacture of oxy-alcohols at 25% ad valorem and no additional duty.
chexane	-do-	
r cyclic hydrocarbons	-do-	
ne	Nil	No basic duty, and additional duty is Rs. 475/kl.
ene** *	40% ad valorem	
ene	80% ad valorem	
ylene	40% ad valorem	
ene	-do-	No additional duty is leviable when used for manufacture of DMT
ed xylene isomers	50% plus Rs. 10/kg.	
ene**	55% plus Rs. 5/kg.	
l benzene	40% ad valorem	
hene	100% plus Rs. 25/kg.	
er xylenes	-do-	
omethane (methyl chloride) hyl chloride and chloroethane	-do-	

Name of the Product	Basic Duty	Remarks
Dichloromethane (methylene chloride)	-do-	
Chloroform (trichloromethane)	100% plus 25/kg.	
Carbon tetrachloride	-do-	
1,2-Dichloroethane (ethylene dichloride)	-do-	When imported for manufacture of PVC, duty i 25% ad valorem and no additional duty is levial
1,2-Dichloropropane (propylene dichloride) & dichlorobutanes	-do-	
Other saturated chlorinated derivatives of acyclic hydrocarbons	-do-	Trichloroethane+. Duty is 30% ad valorem if us for manufacture of deflection components.
Vinyl chloride (chloroethylene)*	-do-	
Trichloroethylene+	-do-	
Tetrachloroethylene	-do-	
Other unsaturated chlorinated derivatives of acylic hydrocarbons	-do-	
Fluorinated, brominated or iodinated derivatives of acyclic hydrocarbons	-do-	
Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens	-do-	Trichloro trifluoroethylene+ Trichloro trifluoro ethane. Duty is 30% is used for manufacture of deflection components.
1,2,3,4,5,6-Hexachlorocyclohexane	-do-	
Other halogenated derivatives of cyclanic, cyclenic or cycloterpenic hydrocarbons	-do-	
Chlorobenzene, o-dichlorobenzene t-dichlorobenzene	-do-	
Hexachlorobenzene & DDT (1,1,1-tri-chloro 2,2-bis (p-chlorophenyl) ethane	-do-	If imported by or on behalf of Government, du 15% ad valorem, DDT formulations: If for pur of malaria eradication then (i) no duty; (ii) no additional duty.
Other halogenated derivatives of aromatic hydrocarbons	-do-	
Derivatives containing only sulphogroups, their salts and ethyl esters	-do-	
Derivatives containing only nitro or only nitroso group	-do-	
Other sulphonated nitrated or nitrosated derivatives of hydrocarbons, whether or not halogenated	-do-	
Methanol* (methyl alcohol)	80% ad valorem	
Prapan 1-ol (propyl alcohol)*	70% ad valorem	Additional duty exempted if used for industrial or research purpose
Propan 2-ol (isopropyl alcohol)*+	70% ad valorem	Exempted from additional duty.
Butan 1-ol (n-butyl alcohol)	100% plus Rs. 25/kg.	
Other butanols	-do-	
Pentanol (amyl alcohol) and isomers thereof	-do-	
Octanol (octyl alcohol) and isomers thereof	-do-	
Dodecan-1-ol (lauryl alcohol), hexadecan-1-ol (cetyl alcohol) and octadecan-1-ol (stearyl alcohol)	-do-	

of the Product	Basic Duty	Remarks
r acyclic alchols	100% plus Rs. 25/kg.	
alcohol	-do-	
lic terpene alcohols	-do-	
r unsaturated monohydric cohols	-do-	
lene glycol#	110% ad valorem	
ylene glycol	30% plus Rs. 5/kg.	
hyl-2-(hydroxymethyl) ropane-1,3-diol	100% plus Rs. 25/kg.	
taerythritol	-do-	If imported from Brazil, Turkey, Egypt, Chile, Mexico, Yugoslavia, Republic of Korea, Tunisia, Uruguay, Paraguay, Peru, Bangladesh, Romania, rate is 50% of table table.
nnitol	-do-	
bitol (D-glucotol)	100% ad valorem	If used for purpose of manufacture of ceramic capacitors, then (i) rate of duty 30% (ii) no additional duty.
ier polyhydric alcohols	-do-	
logenated, sulphonated, nitrated or itrosated devts of acyclic alcohols	-do-	
nthol	-do-	
clohexanol, methyl cyclohexanols and dimethyl cyclohexanols	-do-	
rols and inositols	-do-	
rpeneols++	-do-	
her cyclic alcohols	-do-	
nzyl alcohol++	-do-	
her aromatic alcohols	-do-	
enol**$ (hydroxybenzene) and its salts	50% plus Rs. 5/kg.	When imported for making pesticides phenol is exempted from additional duty.
esols and its salts	100% plus Rs. 25/kg.	Metacresol**
tyl phenol and their isomers	-do-	
nyl phenol	70% plus Rs. 5/kg.	
lenols and their salts	100% plus Rs. 25/kg.	Alphanaphthol: exempted from additional duty if used for pesticide manufacture.
phthols and their salts	-do-	Alpha naphthol: Basic duty is 60% ad valorem if used for carbaryl manufacture.
her monophenols	-do-	Para tertiary butyl phenol**
orcinol and its salts	-do-	
lroquin (quinol) and its salts	-do-	
s of 4,4'-isopropylidene diphenol liphenylol propane)	-do-	
phenol	40% plus Rs. 5/kg.	
er polyphenols	100% plus Rs. 25/kg.	
nol alcohols	-do-	
logenated, sulphonated, nitrated or nitrosated derivatives of phenols or phenol alcohols	-do-	
hyl ether	-do-	
er acyclic ethers and their halo- enated, sulphonated, nitrated or rosated derivatives	-do-	

Name of the Product	Basic Duty	Remarks
Cyclanic, cyclenic or cycloterpenic ethers and their halogenated, sulphonated, nitrated or nitrosated derivatives	100% plus Rs. 25/kg.	
Aromatic ethers and their halogenated sulphonated, nitrated or nitrosated derivatives	-do-	
2,2-Oxydiethanol (diethylene glycol)	-do-	
Monomethyl ether of ethylene glycol or of diethylene glycol	-do-	Ethylene glycol monomethyl ether+
Monobutyl ethers of ethylene glycol++ or of diethylene glycol	-do-	
Other monoalkyl ethers or ethylene glycol or diethylene glycol	-do-	
Ether phonols, other alcohol phenols	-do-	
Alcohol peroxides, other peroxides ketone peroxodes	-do-	
Ethylene oxide	-do-	
Propylene oxide	-do-	
1-Chloro-2,3-epoxypropane (epichlohydrin)	-do-	
Acetals and hemiacetals, whether or not with other oxygen function and their halogenated, sulphonated nitrated or nitrosated derivatives	-do-	
Methanol (formaldehyde)	-do-	
Ethanol (acetaldehyde)	-do-	
Butanol (butyraldehyde, normal isomer)	-do-	
Other acyclic aldehydes without oxygen fuction	-do-	Isobutyl propionaldehyde. No additional duty is leviable
Benzaldehyde	-do-	
Other cyclic aldehydes without oxygen function	-do-	
Aldehyde-alcohols	-do-	
Vanillin	-do-	
Ethyl Vanillin	-do-	
Other aldehydes with other oxygen function	-do-	
Cyclic polymers of aldehydes	-do-	
Paraformaldehyde+**	-do-	
Acetone*+	-do-	
Butanone (methyl ethyl ketone)	-do-	
Methyl isobutyl ketone	-do-	
Other acyclic ketones without other oxygen function	-do-	
Camphor	110% ad valorem	If imported from Burma duty: 20% ad valorem.
Cyclohexanone and methyl cyclo hexanones	100% plus Rs. 25/kg.	Cyclohexanone: If imported for manufacture of ferrites, capacitors, magnetic tape then (i) Rate of duty: 30% and (ii) no additional duty.
Ionones and methyl ionones	-do-	

me of the Product	Basic Duty	Remarks
her cyclenic ketones without other oxygen function	100% plus Rs. 25/kg.	
romatic ketones without other oxygen function	-do-	
iacetone alcohol	-do-	
etone phenols and ketones with other oxygen function	-do-	
nthraquinone	-do-	
ther quinones	100% ad valorem	
ormic acid	-do-	
alts of formic acid	100% plus Rs. 25/kg.	
sters of formic acid	-do-	
Acetic acid*	70% ad valorem	
odium acetate	100% plus Rs. 25/kg.	
Cobalt acetate	-do-	
Acetic anhydride	-do-	
Tetra acetic acid*	-do-	
Ethyl acetate	-do-	
Vinyl acetate	-do-	
n-Butyl acetate*	-do-	
Isobutyl acetate*	-do-	
2-Ethoxy ethyl acetate	-do-	
Other esters of acetic acid	-do-	
Mono/di-tri-chloroacetic acid their salts and esters	-do-	
Propionic acid, its salts and esters	-do-	
Butyric acids, valeric acids and their salts and esters	-do-	
Palmitic nitric acids, stearic acids*, their salts and esters	-do-	
Acrylic acid[$] and its salts	-do-	
Esters of acrylic acid	-do-	
Methacrylic acid[$], its salts and esters	-do-	
Oleic**, linoleic or linolenic acids their salts and esters	-do-	
Cyclanic, cyclenic or cycloterpenic monocarboxylic acids, their anhydrides, halides, peroxides, peroxyacids and their derivatives	-do-	
Benzoic acids	-do-	
Benzoyl peroxide & benzoyl chloride	-do-	
Phenylacetic acid, its salts and esters	-do-	
Oxalic acid, its salts and esters	-do-	
Adipic acid, its salts and esters	-do-	
Azelaic acid, sebacic acid, their salts and esters	-do-	
Maleic anhydride	-do-	
Cyclanic, cyclenic or cycloterpenic, polycarboxylic acid, their anhydrides, halides, peroxides, peroxyacids and their derivatives	-do-	

Name of the Product	Basic Duty	Remarks
Dibutyl orthophthalates**	100% plus Rs. 25/kg.	
Dioctyl orthophthalates	-do-	
Dinonyl or didecyl ortho phthalates	-do-	
Other esters of orthophthalates	-do-	
Phthalic anhydride	-do-	
Terephthalic acid and its salts	150% ad valorem plus Rs. 15/kg.	Exempted from additional duty.
Dimethyl terephthalate	-do-	Basic preferential duty 140% plus Rs. 15/kg. I imported from Mauritius, Seychelles, Tonga, 14 ad valorem.
Lactic acid, its salts and esters	100% plus Rs. 25/kg.	Butyl acetate can be imported at 30% ad valor if used for manufacture of semiconductor devic
Tartaric acid	100% plus Rs. 25/kg.	
Salts and esters of tartaric acid	-do-	
Citric acid	40% plus Rs. 5/kg.	
Sales and esters of citric acid	100% plus Rs. 25/kg.	Ammonium citrate and triammonium citrate ca imported at 30% ad valorem if used in the ma facture of semiconductor devices.
Gluconic acid, its salts and esters	-do-	
Phenyl glycolic acid (mandelic acid) its salts and esters	-do-	
Salicylic acid++ and its salts	-do-	If imported from UAR or Yugoslavia-- 50% of table rate.
o-Acetyl salicylic acid, its salts and esters	-do-	
Other esters of salicylic acid and their salts	-do-	
Carboxylic acids with aldehyde or ketone but without other oxygen function, their anhydrides, halides, peroxides, peroxyacids and their derivatives	-do-	Dicarboxylic acid$
Phosphoric esters and their salts	-do-	
Thiophosphoric esters	-do-	
Methylamine, di#/trimethylamine and their salts	-do-	
Diethylamine and its salts	-do-	
Cyclohexanylamine	100% ad valorem	
Other acyclic monoamines and their derivatives	100% plus Rs. 25/kg.	Triethylamine**
Ethylene di/tri ethyleneamines	-do-	Triethyleneamine+
Other ethylene diamine salts	-do-	
Hexamethylene diamine and its salts	-do-	
Other acyclic polyamines and their derivatives	-do-	Hexamethylene tetramine**++
Polyamines	-do-	
Cyclanic, cyclenic or cycloterpenic mono- or polyamines, and their derivatives and salts thereof	-do-	
Aniline** and its salts	90% ad valorem	
Aniline derivatives and its salts, other than metanilic acid	100% ad valorem	

of the Product	Basic Duty	Remarks
ilic acid	150% plus Rs. 15/kg.	
cine and their salts other than ho toluidine	100% ad valorem	
toluidine	150% plus Rs. 15/kg.	
enylamine and its derivatives	100% plus Rs. 25/kg.	
phthylamine (alpha naphthyl- ine) 2-naphthylamine (beta phthyl amine) other than phenyl ri acid	100% ad valorem	
r aromatic monoamines	100% plus Rs. 25/kg.	
- p-Phenylenediamine, diamino- luenes and their derivatives	-do-	
nino stilbene	150% plus Rs. 15/kg.	
r aromatic polyamines other an diamino stilbene	100% ad valorem	
oethanolamine and its salts	100% plus Rs. 25/kg.	
hanolamine and its salts	-do-	
thanolamine and its salts	-do-	
r amino alcohols, their ethers d esters, salts thereof	-do-	
no hydroxy naphthalene sul- onic acids and their salts	-do-	
idines, dianisidines, phenetidines d their salts	-do-	
r amino-naphthols/phenols, their hers and esters, salts thereof	-do-	
no aldehydes, amino ketones and nino quinones; salts thereof	-do-	
ne and its esters, salts thereof	-do-	
amic acid and its salts	-do-	
r amino acids and their esters, lts thereof	-do-	
no alcohol-phenols, amino acid henols and other amino mpounds other than diethyl eta amino phenol	100% ad valorem	
line and its salts	100% plus Rs. 25/kg.	
thins and other phosphoamino- pds	-do-	
r quaternary ammonium salts d hydroxides	-do-	
ic amides and derivatives, salts reof	-do-	Dimethyl formamide#, dimethyl acetamide#.
nes and their derivatives, salts reof	-do-	
r cyclic amides and their deri- tives, salts thereof	-do-	
charine and its salts	Rs. 50/kg.	If imported from Burma, duty is 'Nil'.
r carboxyimide function compds.	100% plus Rs. 25/kg.	
nes and other devts., salts thereof	-do-	
ylontrile	-do-	

Name of the Product	Basic Duty	Remarks
Dicyandiamide	100% plus Rs. 25/kg.	
Other nitrile function compounds	-do-	
Azo/Diazo/Azoxy compounds	-do-	
Organic derivatives of hydrazine/ hydroxylamine	-do-	
Isocyanates	-do-	
Other compounds with nitrogen functions	-do-	
Dithiocarbonates (Xanthates)	-do-	
Thiocarbomates and dithiocarbamates	-do-	
Thiuram, mono/di/tetrasulphides	-do-	
Methionine	-do-	
Other organic sulphur compounds	-do-	Diamino diphenyl sulphone**
Other organo-inorganic compounds	-do-	
Tetrahydrofuran	-do-	Duty is 30% ad valorem if used for manufactu deflection components.
2-Furaldehyde (furfuraldehyde)	-do-	
Furfuryl alcohol and tetrahydro-furfuryl alcohol	-do-	
Other heterocyclic compounds containing an unfused furan ring	-do-	
Coumarin, methylcoumarins and ethyl coumarins	-do-	
Other lactones	-do-	
Other heterocyclic compounds containing an unfused pyrazole ring	-do-	
Hydantoin and its derivatives	-do-	
Other heterocyclic compounds containing an unfused pyridine ring	-do-	
Phenazone (antipyrin) and its devts.	-do-	
Other hetero cyclic compounds containing unfused imidazole ring	-do-	
Pyridine and its salts	-do-	
Compounds containing a quinoline or isoquinoline ring system	-do-	
Quinoline	-do-	
Malonyl urea (Barbituric acid)	-do-	
Other compounds containing a pyridine ring or piperazine ring	-do-	
Melamine	-do-	Duty is 45% ad valorem if used in manufactur tantalum capacitors.
Caprolactam	45% ad valorem	Basic preferential duty is 140% plus Rs. 15/kg
Other lactams	100% plus Rs. 25/kg.	
Compounds containing an unfused thiazole ring	-do-	
Compounds containing an unfused benzothiazole ring	-do-	
Compounds containing an unfused phenothiazole ring	-do-	
Sulphonamides	60% ad valorem	If imported from Mauritius, Tonga and Seych duty is 54% ad valorem.

ne of the Product	Basic Duty	Remarks
vitamins, unmixed	100% plus Rs. 25/kg.	Basic preferential duty is 94% plus Rs. 25/kg. If imported from UAR, Yugoslavia rate is 50% of table rate.
amin A and their derivatives	60% ad valorem	i) Basic preferential duty is 94% plus Rs. 25/kg. ii) If imported from Mauritius, Tonga, or Seychelles 54% ad valorem. iii) If imported from UAR/Yugoslavia rate is 50% of table rate, not applicable for derivatives
amin B1 and its derivatives	-do-	-do- Item (iii) not applicable.
tamin B2 and its derivatives	-do-	-d.-
tamin B3/B5 and its derivatives	-do-	-do-
itamin B6 and its derivatives	-do-	-do-
amin B12 and its derivatives	-do-	-do-
itamin C and its derivatives	-do-	-do-
itamin E and its derivatives	-do-	-do-
itamin H and its derivatives	-do-	-do-
ther vitamins and their derivatives	-do-	Exemptions (i) and (ii) only available.
ituitary (anterior) or other hormones	100% plus Rs. 25/kg.	Basic preferential duty is 90% plus Rs. 25/kg. If imported from Brazil, Turkey, Egypt, Chile, Mexico, Spain, Yugoslavia, Republic of Korea, Tunisia, Uruguay, Peru, Paraguay, Bangladesh and Romania the rate of duty is 15% ad valorem.
Cortisone, hydrocortisone, predisone (dehydrocortisone) and prediniso-lone/dehydro hydro cortisone)	-do-	-do-
Halogenated derivatives of adrenal cortical hormones	-do-	-do-
Insulin and its salts	-do-	Basic preferential duty 90% plus Rs. 25/kg.
Oesterogens and progestrogens	-do-	-do-
Other steroids used primarily as hormones	-do-	-do-
Quinine and its salts	-do-	Quinine hydrochloride: If imported from UAR/ Yugoslavia rate is 50% of table rate.
Other alkaloids of cinchona	60% ad valorem	If imported from UAR/Yugoslavia 50% of basic rate is applicable. If imported from Mauritius, Tonga, and Seychelles duty is 90% ad valorem.
Caffeine and its salts	100% plus Rs. 25/kg.	
Ephedrine and their salts	-do-	Basic preferential duty: 90% plus Rs.25/kg.
Theophylline and aminophylline	-do-	-do-
Nicotine and its salts	-do-	
Penicillin and their derivatives	60% ad valorem	Basic Preferential duty: 94% ad valorem plus Rs. 25/kg. If imported from Mauritius, Seychelles, Tonga, rate is 54% ad valorem. If imported from UAR/Yugoslavia, rate is 50% of table rate. Potassium penicillin V and potassium penicillin G first crystals are imported free of basic and additional duty.
Streptomycin and their derivatives	-do-	-do-
Tetracycline and their derivtives	-do-	-do-

Name of the Product	Basic Duty	Remarks
Chloramphenicol and its derivatives	-do-	-do-
Erythromycin and its derivatives	-do-	-do-
Other antibiotics	-do-	-do-
Other organic compounds	100% plus Rs. 25/kg.	

Notes:

* 1. Indicates: (i) Rate of Duty: 30% and (ii) No additional duty if imported for manufacture of semiconductor devices.

2. Acids and chemicals imported for the manufacture of saccharines or substances of like nature or use to sachharine rate of customs will be Rs. 50 per

# 3. Indicates: (i) Rate of duty 30% and (ii) No additional duty, if imported for the manufacture of etched or formed aluminium foils, electrolytic capacit

+ 4. Indicates: (i) Rate of duty 30%, (ii) No additional duty if imported for manufacture of electronic valves and tubes, semiconductor devices, L.C. paper phenolic or glass epoxy laminates, potentiometers, capacitors.

++5. Indicates: (i) Rate of duty 30% and (ii) No additional duty if imported for manufacture of potentiometers.

**6. Indicates (i) Rate of duty 30% and (ii) No additional duty if imported for manufacture of copper clad laminates, printed circuit boards.

$ 7. If used for manufacture of leather chemicals, then (i) rate of duty 20% ad valorem and (ii) no additional duty.

FERTILISERS

Urea*	60% ad valorem	If imported from UAR, Yugoslavia rate is 50% o table rate.
Ammonium sulphate	Nil	Exempted from Auxiliary duty.
Ammonium nitrate	60% ad valorem	
Mixtures of ammonium nitrate with calcium carbonate or other inorganic non-fertilizers	-do-	
Sodium nitrate	-do-	Import of sodium nitrate containing not more than 16.3% by weight of nitrogen has no basic duty. If condition satisfied no auxiliary duty also.
Double salts and mixtures of calcium nitrate and ammonium nitrate	-do-	Import of calcium ammonium nitrate no duty; no additional duty.
Calcium cyanamide	-do-	
Mixture of urea and ammonium nitrate in aqueous or ammoniacal solution	-do-	
Superphosphates (single, double, & triple)	-do-	In case of semi-finished phosphates, if imported from UAR/Yugoslavia rate is 50% of table rate.
Basic slag	-do-	
Crude natural potassium salts like: carnallite, Kainite*, sylvite etc.	-do-	
Potassium chloride	-do-	
Potassium sulphate	-do-	Import of potassium sulphate containing not more than 52% by weight of compound fertilizers has no basic duty. If condition satisfied, no auxiliary duty also.
Any of the fertilisers mentioned in packings of less than 10 kgs.	-do-	
Minerals/chemical fertilisers containing the three fertilisers i.e. nitrogen, phosphorous and potassium	Nil	
Diammonium phosphate#	60% ad valorem	
Monoammonium phosphate	-do-	

ame of the Product	Basic Duty	Remarks
hemical/Mineral fertilisers containing elements of nitrogen and phosphorous	Nil	

otes:

1. Where amonium chloride is imported for use as fertiliser then (i) no customs duty and (ii) no additional duty.
2. Indicates: If the said goods are imported for use as manure then rate of duty is nil.
3. Indicates: If the said goods are imported for use as manure or for production of complex fertilisers then rate of duty is nil.

YESTUFFS

Disperse dyes	150% plus Rs. 15/kg.	If imported from UAR/Yugoslavia, rate of duty is 50% of table rate.
Acid dyes	-do-	-do-
Basic dyes	-do-	-do-
Direct dyes	-do-	-do-
Vat dyes	-do-	-do-
Reactive dyes	-do	-do-
Pigments and synthetic organic colouring materials	-do-	-do-
Colour lakes	-do-	
Pigments based on titanium dioxide	-do-	
Pigments based on chromium compounds	-do-	-do-
Pigments based on cadmium compds.	-do-	
Ultramarine and preparations based thereon	-do-	
Lithopone and other pigments based on zinc sulphide	-do-	
Pigments based on hexacyanoferrates	-do-	If imported from UAR/Yugoslavia rate of duty is 50% of the table rate.

MISCELLANEOUS CHEMICALS

Insecticides	100% plus Rs. 25/kg.	If imported from UAR/Yugoslavia, then rate of duty is 50% of table rate.
Fungicides	-do-	-do-
Herbicides, anti-sprouting products and plant growth regulants	-do-	-do-
Disinfectants	-do-	-do-

ote on exemption for goods imported against Advance Licence or Replenishment Licences:

The Central Government exempts goods imported into India, against an Advance Licence issued under the Imports (Control) Order, 1955, or obtained against an Advance Release Order, being materials required to be imported for the purpose of manufacture of specified products or replenishment of materials used in manufacture of specified products, or both, for execution of export order.

ote on import duty for goods imported by air:

The Central Government exempts the goods imported into India by air from so much of the duty of customs as is equivalent to the duty of customs leviable on such goods with reference to that part of the value of such goods which is calculated by including the cost of freight in excess of --

(a) 15% of the f.o.b. value of such goods; or

(b) where such cost of freight is less than 15% of the f.o.b. value of such goods, such percentage of the f.o.b. value as is actually incurred.

Additional Duty: In respect of any article imported into India, if it is liable to excise duty, if produced in India, then a duty equal to the excise duty for the time being in force in respect of such an article, will be the additional duty.

Auxiliary Duty: In respect of all goods imported into India, a rate equal to 50% of the value of the goods shall be treated as auxiliary duty.

Further exemptions are available upon fulfilment of conditions specified. Detaiils may be obtained from the Customs Authorities

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The following is a compilation of the existing Central Excise Tariff in respect of chapters 28, 29 and 31 dealing with chemicals and fertilisers. Amendments upto March, 1988 have been incorporated. We hope the information finds favour with the readers and any suggestions/comments would be most welcome.

Central Excise Tariffs

Name of the Product	Basic Duty	Remarks
CHEMICAL ELEMENTS		
Chlorine	Rs. 90/tonne	(1) 'NIL' if used (a) in the manufacture of chlorate of calcium or bleach liquor, or soda bleach liquor, sodium hydrochlorite solution. (b) in manufacture of hydrochloric acid.
Fluorine, Bromine, Iodine	15%	'NIL' if produced by factories belonging to the Central Government and used by any Government Department.
Sulphur, Colloidal sulphur	15%	
Carbon	15%	
Oxygen (including liquified or solidified gas) in cylinder	75 paise/m^3 at pres. of 15°C	
Oxygen -- supplied through pipeline	30 paise/m^3 at pres. of 15°C	(1) 'NIL' if used in manufacture of (a) heavy water (b) medicinal grade oxygen (c) fertiliser outside place of production of oxygen and (d) manufacture of iron & steel or articles of iron and steel.
Oxygen in liquid form	65 paise/m^3 at pres. of 15°C.	
Other gases	15%	(1) Hydrogen# (2) Hydrogen: NIL if produced in factories belonging to Central Government and used by Govt. Depts. (3) Nitrogen gas - 'NIL' if supplied to Fertilizer Corporation of India, to Heavy Water Plant, Talcher. (4) Nitrogen -'NIL' if consumed within factory of production in manufacture of textile fibre or yarns (5) Silicon - 'NIL'.
Alkali or alkaline earth metals*	15%	
Rare earth metals	15%	
Scandium & yttrium	15%	
Mercury	15%	
INORGANIC ACIDS		
Hydrochloric acid#+	15%	(1) 'NIL' if (a) quantity not exceeding half kg. and (b) drawn for test or (c) for inspection by Govt. Dept.
Chlorosulphuric acid+	15%	(1) 'NIL' if consumed within factory for manufacture of fertilizers. (2) 'NIL' if (a) quantity not exceeding half kg and (b) drawn for test or (c) for inspection by Government Department.
Sulphuric acid#+, oleum & anhydrides	15%	(1) 'NIL' if (a) Quantity not exceeding half kg. and (b) Drawn for test or (c) for inspection by Govt. Dept. (2) 'NIL' if sulphuric acid is regenerated from dilute sulphuric acid provided excise duty is paid on the fresh sulphuric acid. (3) 'NIL' if used by manufacture for (i) drying air in air tower (ii) demineralisation of water (iii) generation of oxides of nitrogen -- all for manufacture of sulphuric acid. (4) 'NIL' if used in manufacture of fertilisers.

Name of the Product	Basic Duty	Remarks
Nitric acid^{+}	NIL	(1) 'NIL if (a) quantity not exceeding half kg. and (b) drawn for test or (c) for Inspection by Government Dept.
Other sulphonitric acids^{+}	15%	(1) 'NIL" if consumed within factory for manufacture of fertilisers. (2) 'NIL' if (a) quantity not exceeding half kg. and (b) drawn for test or (c) for Inspection by Govt. Dept.
Phosphoric acid^{+}, polyphosphoric acid^{+} & diphosphorous pentoxide	15%	(1) 'NIL' if consumed within factory for manufacture of fertilisers. (2) 'NIL' if (a) quantity not exceeding half kg. and (b) drawn for test or (c) for inspection by Govt. Dept.
Boric acid^{+} and oxides of boron^{+}	15%	(1) 'NIL" if consumed within factory for manufacture of fertilisers. (2) 'NIL' if (a) quantity not exceeding half kg. and (b) drawn for test or (c) for inspection by Govt. Dept.
Carbon dioxide	Rs. 1/kg.	(1) 'NIL' if (a) quantity less than 6 kg and (b) drawn for test or (c) for inspection by Government Departments. (2) 'NIL' if used by (a) hospitals, (b) research laboratories, (c) university, (d) fire services (e) defence establishment, (f) industrial purpose than the manufacture of beverages/aerated water. (3) 'NIL' where carbon dioxide is used for manufacture of liquid carbon dioxide or solid carbon dioxide by a testing plant duly registered and the final carbon dioxide is leviable towards excise.
Other inorganic acids^{+} and other inorganic oxygen compounds of non metals	15%	'NIL' if consumed within factory for manufacture of fertilisers.
Halides & halide oxides of non-metals	15%	'NIL' if consumed within factory for manufacture of fertilisers.
Sulphides of non-metals: commercial phosphorous trisulphide	15%	'NIL' if consumed within factory for manufacture of fertilisers.
Ammonia (anhydrous, aqueous)	Rs. 1000/tonne	(1) Ammonia Gas -- 'NIL' if ammonia is produced within heavy water plant and consumed captively in manufacture of heavy water. (2) Ammonia -- 'NIL' (a) if used in manufacture of fertiliser, (b) if consumed in factory of production in refrigeration plant, in purification of gases in synthesis, in maintaining pressure in plant manufacturing ammonia.
Caustic soda$^{*\#}$, caustic potash$^{*\#}$, sodium peroxide*, potassium peroxide*	15%	Caustic soda: (1) Rate of duty 3% if it is used for purification of brine for manufacture of products within the factory. (2) 'NIL' if quantity does not exceed 250 grams in case of solid and 500 ml in case of solution provided it is drawn for test purposes. (3) 'NIL' in respect of caustic soda recovered from spent caustic lye or bleach liquor obtained in manufacture at a factory other than the factory where the spent soda lye or black liquor is obtained provided excise duty is already paid on the initital caustic soda taken.
Magnesium hydroxide*/peroxide*, strontium oxide*/hydroxide*/peroxide*, barium oxide*/hydroxide*/peroxide*	15%	
Zinc oxide*/peroxide*	15%	(1) Zinc oxide -- 'NIL' if used in manufacture of plates of electric storage batteries, rubber, glass, pottery or ceramic goods.
Aluminium oxide*	NIL	'NIL' if used in the manufacture of grinding wheels or coated abrasives.
Aluminium hydroxide*	15%	

ame of the Product	Basic Duty	Remarks
hromium oxide/hydroxide*	15%	
anganese oxide*	15%	
ron oxide*/hydroxide*	10%	
arth colours containing 70% or more by weight of iron*	15%	
Cobalt oxide*/hydroxide*	15%	
Titanium oxide*	10%	
ead Oxide*, red lead*, orange lead*	10%	(1) Red Lead -- 'NIL' if used for manufacture of plates for electric storage batteries, rubber, glass, pottery or ceramics.
Hydrazine and hydroxylamine and their inorganic salts*, other metal oxides, hydroxides and peroxides	15%	(1) Zinc hydroxide -- 'NIL' if used in manufacture of zinc oxide
Other inorganic bases*	15%	
Other metal oxides*/hydroxides*/ peroxide*	15%	(1) Mercuric and mercurous oxide -- 'NIL' if used in the manufacture of pesticides.
Fluorides, fluorosilicates, fluoroaluminates and other complex fluorine salts.	15%	
Chlorides, chloride oxides, chloride hydroxide	15%	(1) Meruric chloride and mercurous chloride -- 'NIL' if used in the manufacture of pesticides.
Bromide and bromide oxides	15%	
Iodides and iodide oxides	15%	
Calcium hypochlorite	15%	
Other hypochlorites; chlorites & hypobromites	15%	(1) Sodium hypochloride -- 'NIL' if used in the manufacture of textile fibres or yarns (2) Bleach liquor -- 'NIL'.
Potassium chlorate	Rs. 100/kg.	(1) Rate subject to maximum of 15% ad valorem.
Other chlorates, perchlorates, bromates, perbromates, iodates and periodates.	15%	
Sodium hydrosulphite	15%	
Other sulphides, polysulphides, sulphoxylates	15%	Sodium sulphide -- 'NIL' if used in manufacture of textile fibres or yarns.
Sulphites, thiosulphates	15%	(1) Sodium sulphite -- 'NIL' if consumed within factory of production in manufacture of textile fibres or yarns.
Sulphates, alums, persulphates	15%	(1) Copper sulphate -- 'NIL'. (2) Zinc sulphate -- 'NIL' if used as micronutrient. (3) Sodium sulphate -- 'NIL' if used in the manufacture of textile fibres or yarns.
Nitrites, nitrates	15%	
Phosphites, hypophosphites, phos phates, polyphosphates	15%	
Soda ash	15%	(1) Excise duty -- 3% if it is used for the purification of brine within the same factory. (2) 'NIL' if quantity not exceeding 250 grams provided it is drawn for test purpose.
Soda bicarbonate	15%	
Other carbonates, percarbonates	15%	
Cyanides, cyanide oxides	15%	(1) Gold potassium cyanide -- If used in the electronic industry and manufacture from gold then excisable value will only be the value of gold used in the gold potassium cyanide.
Cyanates, thiocyanates, fulminates	15%	
Sodium silicate#	15%	

Name of the Product	Basic Duty	Remarks
Other silicates	15%	
Borates, perborates	15%	
Sodium dichromate	15%	
Potassium dichromate	15%	
Potassium permanganate	15%	
Other salts of oxometallic or peroxometallic acids	15%	
Other salts of inorganic acids or peroxoacids excluding azides	15%	
Rare earth metals of yttrium/scandium	15%	
Hydrogen peroxide#	15%	
Phosphides	15%	
Calcium carbide#	15%	
Other carbides	15%	(1) Silicon carbide -- 'NIL' if consumed in the manufacture of grinding wheels or coated abrasive.
Hydrides, Nitrides, azides, silicides, borides	15%	

NOTES:

* 1. Indicates rate of duty is 'NIL' if (a) quantity not exeeeding 250 grams or 250 mls. and (b) drawn for test purposes by Government test house or (c) for test in the laboratories or (d) for preservation by manufacturers for investigation or (e) for departmental purpose by an officer on duty authorised by Collector provided proper records are maintained.

# 2. Indicates exemption from so much of the duty as equivalent to duty on the cost of packing, provided (a) the packing is of a durable nature an (b) is returnable to the supplier.

3. Chemical preparations for photographic uses (other than varnishes, glues, adhesives and similar preparations) NIL excise duty.

4. In respect of excisable goods bought for manufacture of goods by an 100% Export Oriented undertaking for the purpose of export (i) no excis duty, (ii) no additional duty.

5. In respect of goods manufactured in a factory and used witin the factory for the production of goods, then no excise duty is chargeable in respec of the inputs.

6. In respect of goods manufactured in a factory as job work and used in the manufacture of goods on which excise duty is leviable (whether in whol or in part), no excise duty is leviable for such inputs.

7. In respect of gases allowed to escape into the atmosphere by flare system or otherwise, no excise duty is leviable.

+ 8. In respect of such goods no excise duty leviable if they are produced in ordinance factories beloing to C.G. & intended for consumption b ordnance factories or for supply to C.G. Department.

9. In respect of all goods used in the manufacture of zinc or lead concentrates no excise duty.

ORGANIC CHEMICALS

Name of the Product	Basic Duty	Remarks
Acetylene (whether in dissolved condition or not)	Rs. 11/m³ at normal pressure at 15°C	'NIL' if (i) produced in a portable generator by the reaction of water dipping slowly on calcium carbide or (ii) if used in an undissolved condition, within factory of production of acetylene in manufacture of polyvinyl chloride resin
Other acyclic hydrocarbons	15%	
Cyclic hydrocarbons	15%	'NIL' if (i) Not more than 10% by volume of said goods distills below 120°C and (ii) goods consist of (a) aromatic hydrocarbons, xylene and its isomers, higher homologues o xylene, aromatic hydrocarbons of boiling point higher than xylene.
Chlorofluoro hydrocarbons# of methane or ethane	35%	'NIL' if (i) allowed to escape in atmosphere by flare system or (ii) manufactured by laboratories for their own use.

Name of the Product	Basic Duty	Remarks
Other halogenated derivatives of hydrocarbons	15%	
Sulphonated, nitrated or nitrosated derivatives of hydrocarbons, whether or not halogenated	15%	
Methanol	15%	
Other acyclic alcohols, their halogenated/sulphonated/nitrated devts.	15%	Monoethylene glycol -- 'NIL' if used in the manufacture of polyester chips, polyester staple fibre and tow.
Menthol	15%	
Phenols	15%	
Halogenated, sulphonated, nitrated or nitrosated derivatives of phenols	15%	
Ethers, ether-alcohols, ether-phenols ether alcohol phenols, alcohol peroxides, other peroxides, ketone peroxides.	15%	Para-amino phenols and para nitro phenols -- 'NIL' if used in the manufacture of paracetamol.
Epoxides, epoxyalcohols, epoxyphenols and epoxy ethers	15%	
Acetals and hemiacetals	15%	
Aldehydes	15%	
Halogenated, sulphated, nitrated or nitrosated derivatives of products of aldehydes.	15%	
Acetonal	15%	
Camphor	15%	
Other ketones, quinones and their halogenated, sulphonated, nitrated nitrosated derivatives.	15%	
Acetic acid	15%	
Acetic anhydride	15%	
Other carboxylic acids and their anhydrdes, halides, peroxides and peroxyacids.	15%	
Unsaturated acyclic monocarboxylic acids, their anhydrides, peroxides and peroxyacids	15%	Monochloro acetic acid -- 'NIL' if used in the manufacture of pesticides.
Dimethyl terephthalate	NIL	
Terephthalic acid	NIL	
Other polycarboxylic acids, their anhydrides, halides, peroxides, peroxyacids	15%	
Phosphoric esters and their salts	15%	Phosphorous trichloride -- 'NIL' if used in the manufacture of pesticides.
Esters of other inorganic acids and their salts	15%	
Amine function compounds	15%	Ethylene diamine or ortho phenylene diamine -- 'NIL' if used in the manufacture of pesticides.
Oxygen function amino compounds	15%	
Quaternary ammonium salts & hydroxide	15%	
Carboxyamide function compounds	15%	

Name of the Product	Basic Duty	Remarks
Nitrile function compounds	15%	
Diazo-azo or azoxy compounds	15%	
Organic derivatives of hydrazine or of hydroxyl amine	15%	
Compounds with other nitrogen functions	15%	
Organo sulphur compounds	15%	
Other organo inorganic compounds	15%	
Heterocyclic compounds with oxygen heteroatoms only	15%	
Caprolactam	15%	(i) 'NIL' if produced out of nylon polymer waste by process of recycling of such waste in India (ii) 'NIL' if produced by the depolymerisation of the oligomers present in wash waters.
Other heterocyclic compounds with nitrogen heteroatoms only; nucleic acids	15%	
Other heterocyclic compounds	15%	
Sulphonamides	NIL	
Glycosides, their salts, esters and other derivatives	15%	
Quinine and salts	NIL	
Other vegetable alkaloids	15%	
Penicillin and their derivatives	15%	
Streptomycin and their salts devts.	15%	
Tetracycline and their salts devts.	15%	
Chloramphenicol and their salts, derivatives	15%	
Erythromycin and its salts, devts.	15%	
Other organic compounds	15%	

NOTES:

1. No special Excise duty @ 5% of the effective basic duty is applicable in respect of goods falling under this chapter.

# 2. Indicates exemption from so much of the duty as equivalent to duty on the cost of packing, provided (a) the packing is of a durable nature an (b) is returnable to the supplier.

3. In respect of all excisable capital goods, components, raw materials, consumable spares and packing materials, nil excise duty and no additiona excise duty when bought in connection with manufacture and packing of articles into an 100% export oriented undertaking.

4. In respect of all goods used in the manufacture of zinc or lead concentrates no excise duty.

FERTILIZERS

Animal or vegetable fertilisers, whether or not mixed together	NIL	
Mineral or chemical fertilizers -- Nitrogenous	15%	
Mineral or chemical fertilizers -- Phosphatic	15%	Di-calcium phosphate -- 'NIL' if used in manufacture of animal feed supplements.
Mineral or chemical fertilizers -- Potassic	15%	Zinc sulphate -- 'NIL' if intended for use as a micronutrient.

me of the Product	Basic Duty	Remarks
ineral or chemical fertilizers containing two or three of the fertiliser elements -- nitrogen, phosphate and potassium -- other fertilisers	15%	

OTES:

1. In respect of goods falling in this chapter no excise duty. Exemption not applicable if (i) they are not used as fertiliser; (ii) in the manufacture of fertilisers.

ENERAL NOTES:

. No excise duty in respect of first clearances of specified goods upto the value of Rs. 15 lacs and concessional duty on subsequent clearances in the case of manufacturers having clearances not exceeding Rs. one and a half crores on the preceeding year.

2. Exemtion for all excisable goods produced in a technical, educational, research institute during the course of imparting technical training, or carrying out experiments or research.

3. In respect of goods donated to the welfare of defence personnel (i) No excise duty and (ii) No additional duty of excise.

4. In respect of goods produced in a free trade zone, No excise duty and no additional excise duty leviable.

5. In respect of excisable goods bought into (a) Cochin Export Processing Zone, (b) Kandla Free Trade Zone, (c) Santa Cruz Electronics Export Processing Zone, (d) Madras Export Processing Zone, (e) Falta Export Processing Zone (f) NOIDA Export Processing Zone for use by industries located in the zone for production of goods meant for export: (i) No excise duty and (ii) No additional excise duty.

6. No excise duty isliviable in respect of scrap or waste material in the course of production in manufacture of goods in Kandla Free Trade Zone provided (i) such scrap is out of any goods bought into the said zone from a place outside India and (ii) such scrap is cleared outside the Zone after payment of customs duties.

7. In respect of goods supplied as stores for vessels of the Indian Navy (i) No excise duty and (ii) No additional excise duty leviable.

8. In respect of goods sent abroad for exhibition in International Trade Fair, no excise duty is chargeable.

9. In respect of goods produced in a 100% export-oriented undertaking (i) No excise duty and (ii) No additional excise duty chargeable.

SPECIAL EXCISE DUTY:

In respect of all goods chargeable to excise duty, there shall be levied an additional special excise duty @ 5% of the effective excise duty.

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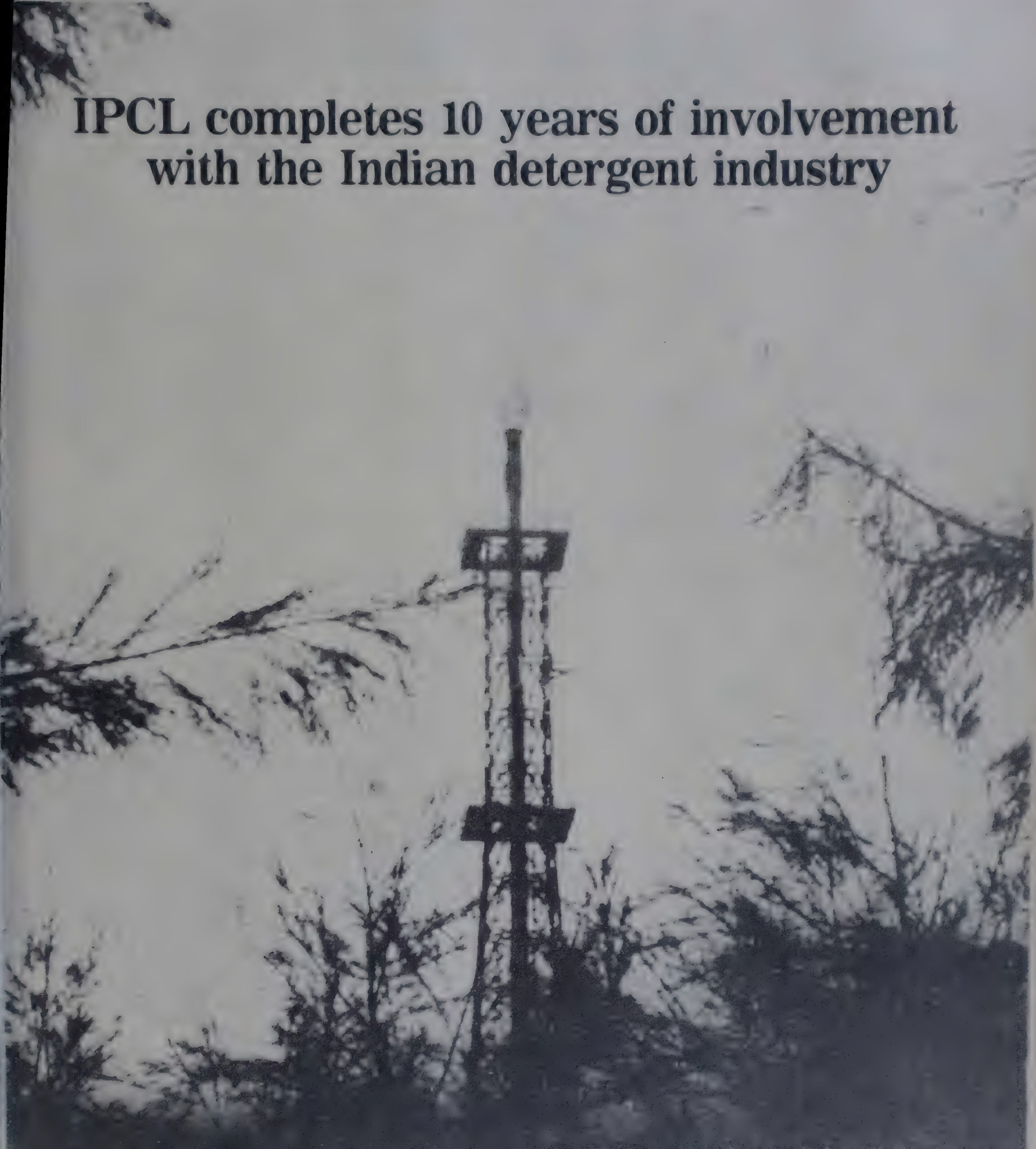

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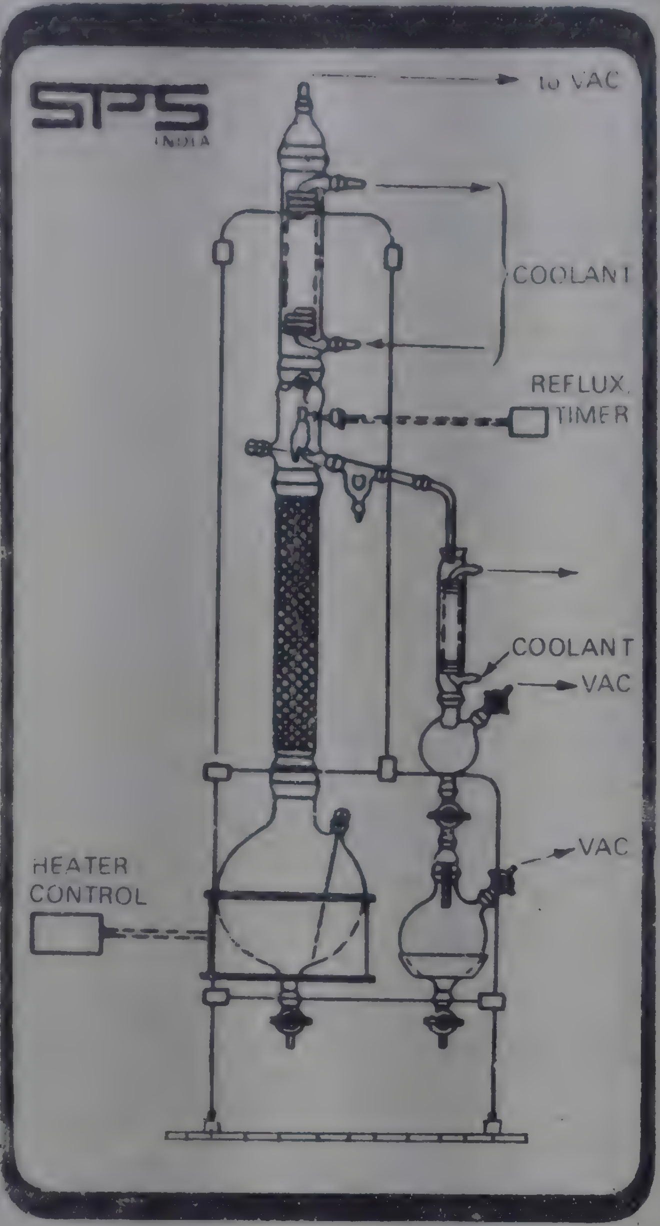

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Industrial Licences and Letters of Intent Issued

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MARCH 1987

SHRI AMBUJA CHEMICALS CO., (Prop. Shri Ambica Mills Ltd.) Opp. Mihir Textiles Ltd., Mithipur, Ahmedabad 380 008. (COB).
Products & Annual Capacity: Synthetic resins 1,251 tonnes and textile auxiliaries.
Licence No. & Date: IL: 20/87 dt. 19.3.87.

UNIVERSAL PLAST LTD., 9, Old Post Office Street, Calcutta 700 001. (COB).
Product and Annual Capacity: PVC leather cloth/foam leather 800 km.
Licence No. & Date: IL: 21/87 dt. 20.3.87.

INDIAN RAYON AND INDUSTRIES LTD. Junagadh, Veraval Road, Veraval 362 266, Gujarat. (NU).
Product and Annual Capacity: Carbon black 20,000 tonnes.
Licence No. & Date: CIL: 108/87 dt. 13.3.87.

ASIAN PEROXIDES LTD., 45, Kalakshetra Road, Madras 600 041. (NU).
Product & Annual Capacity: Hydrogen peroxide 5,000 tonnes.
Licence No. & Date: CIL: 97/87 dt. 5.3.87.

RELIANCE INDUSTRIES LTD., 39, Basant Lok, 1st Floor, Vasant Vihar, New Delhi 110 057. (NU).
Product & Annual Capacity: High density polyethylene (HDPE) 50,000 tonnes.
Licence No. & Date: CIL: 125/87 dt. 25.3.87.

RELIANCE INDUSTRIES LTD., 39, Basant Lok, 1st Floor, Vasant Vihar, New Delhi 110 057. (NU).
Product & Annual Capacity: Polyvinyl chloride 1,00,000 tonnes.
Letter of Intent No. & Date: CIL: 124/87 dt. 25.3.87.

NARENDRA & CO., 59, Gandhi Road, Dehradun. (COB).
Products & Annual Capacity: Industrial explosives (NG) 1,000 tonnes, safety fuse 10 million mtrs., and gun powder 100 tonnes.
Licence No. & Date: IL: 174/87 dt. 9.3.87.

HOECHST INDIA LTD., Hoechst House, Nariman Point, Backbay Reclamation, Bombay. (NA).
Products & Annual Capacity: *Diagnostic reagents* for the test of Amoebiasis 30,000 kits, syphillis 50,000 kits, toxoplasmo 30,000 kits; *Partigen Plates:* Iqe 30,000 plates, alphal feti 30,000 plates; *Tatex test for* IgM 30,000 kits and myglobin 20,000 kits.
Licence No. & Date: CIL: 116/87 dt. 30.3.87.

RANBAXY LABORATORIES LTD., Devika Tower, 11th Floor, 6, Nehru Place, New Delhi. (NA).
Products & Annual Capacity: Ibuprofen (bulk drug) 15 tonnes; ibuprofen formulations (based on 70% of bulk drug produced) 10.50 tonnes.
Licence No. & Date: CIL: 126/87 dt. 26.3.87.

AMBALAL SARABHAI ENTERPRISES LTD., Wadi Wadi, Baroda-7. (NA).
Products & Annual Capacity: Nifedipine and its formulations 1,000 kgs.
Licence No. & Date: CIL: 121/87 dt. 25.3.87.

GLINDIA LTD., Dr. A.B. Road, Bombay 400 025. (NA).
Product & Annual Capacity: Ranitidine 10 tonnes.
Licence No. & Date: CIL: 122/87 dt. 25.3.87.

HOECHST INDIA LTD., Hoechst House, Nariman Point, Backbay Reclamation, Bombay 400 021. (NU).
Products & Annual Capacity: *Bulk Drug:* Trental (Pentoxifylline) 10 tonnes; and *Formulations:* (1) Trental 100 mg. Dragees (2) Trental 400 mg. Dragees and (3) Trental 5 ml injections to the overall capacity of 5 tonnes of pentoxifylline.
Licence No. & Date: CIL: 111/87 dt. 17.3.87.

APRIL 1987

EXCEL INDUSTRIES LTD., 184-87, S.V. Road, Jogeshwari (West), Bombay 400 102. (COB).
Product & Annual Capacity: Red phosphorous 250 tonnes.
Licence No. & Date: IL: 24/87 dt. 21.4.87.

ALBRIGHT MORARJI & PANDIT LTD., Raj Mahal, 3rd Floor, 84, Veer Nariman Road, Bombay 400 020. (COB).
Product & Annual Capacity: Sodium hexameta phosphate 3,000 tonnes.
Licene No. & Date: IL: 26/87 dt. 23.4.87.

ABC PRODUCTS LTD., 43.3, Hazra Road, Calcutta 700 019. (COB).
Products & Annual Capacity: Foundry fluxes 230 tonnes and foundry resins 285 tonnes.
Licence No. & Date: IL: 27/87 dt. 23.4.87.

ALBRIGHT MORARJI & PANDIT LTD., Raj Mahal, 3rd Floor, 84, Veer Nariman Road, Bombay 400 020. (COB).
Product & Annual Capacity: Tri sodium phosphate 5,000 tonnes.
Licence No. & Date: IL: 28/87 dt. 23.4.87.

INDIAN OXYGEN LTD., Oxygen House, P-34, Taratala Road, Calcutta 700 088. (NU).
Product & Annual Capacity: Helium 3,00,000 cub. mtres.
Licence No. & Date: CIL: 38/87 dt. 1.4.87.

BONGAIGAON REFINERY & PETROCHEMICALS LTD., P.O. Dhaligaon, Dist. Kokrajhar, Assam 783 [illegible] (SE).
Product & Annual Capacity: Refinery crude 1.35 M. tonne (after expansion).

Licence No. & Date: CIL: 154/87.

DCW LTD., 'Nirmal', 3rd Floor, 241, Backbay Reclamation, Nariman Point, Bombay 400 021. (SE).
Product & Annual Capacity: Bromine 300 tonnes after expansion.
Licence No. & Date: CIL: 164/87 dt. 27.4.87.

HENKEL CHEMICALS (I) LTD., Poonam Chambers, North Wing, 7th Floor, Shivsagar Estate, Dr. Annie Besant Road, Worli, Bombay 400 018. (NA).
Product & Annual Capacity: Oil well chemicals 5,500 tonnes.
Licence No. & Date: CIL: 163/87 dt. 21.4.87

MAX INDIA LTD., 12th Floor, Devika Tower, 6, Nehru Place, New Delhi 110 019. (NA).
Products & Annual Capacity: (1) Phenylacetyl-7-amino desacetoxy cephalosporanic acid (CEPH G) 35 tonnes and (2) 7-Amino desacetoxy cephalosporanic acid (7-ADCA) 100 tonnes.
Licence No. & Date: CIL: 148/87 dt. 10.4.87.

ROCHE PRODUCTS LTD., 28, Pt. M.M. Malviya Road, Bombay 400 034. (NA).
Products & Annual Capacity: AVATEC 15% premix containing 150 gms of lasalocid sodium per kg feed additive 200 tonnes.
Licence No. & Date: CIL: 165/87 dt. 27.4.87.

SOMAIYA ORGANO CHEMICALS LTD., Fazalbhoy Building, Mahatma Gandhi Road, Bombay 400 023. (NA).
Product & Annual Capacity: Industrial alcohol 8,200 k.litres.
Licence No. & Date: CIL: 162/87 dt. 20.4.87.

KERALA CHEMICALS & PROTEINS LTD., Krishna Kripsa, XXXV/853, South Railway Station Road, Ernakulam, Cochin 682 016. (NA).
Product & Annual Capacity: Compound glue 300 tonnes.
Licence No. & Date: CIL: 171/87 dt. 30.4.87.

MAY 1987

GUJARAT ALKALIES & CHEM. LTD., 'Yashkamal', Sayajiganj, Baroda. (NA)
Products & Annual Capacity: Soda ash (sodium carbonate) 27,400 tonnes
Licence No. & Date: CIL: 199/87 dt. 25.5.87.

INDIAN PETROCHEMICALS CORP. LTD., P.O. Petrochemicals, Dist. Vadodara, Gujarat. (SE).
Products: Linear alkyl benzene 43,500 tonnes (after expansion).
Licence No. & Date: CIL: 204/87 dt. 27.5.87.

SANDOZ (I) LTD., Sandoz House, Dr. A.B. Road, Worli, Bombay. (NA).
Products & Annual Capacity: Formulation of tiamulin hydrogen fumarate 12 tonnes.
Licence No. & Date: CIL: 190/87 dt. 14.5.87.

GLINDIA LTD., Dr. A.B. Road, Worli, Bombay. (COB).
Products & Annual Capacity: Vimeral, vitablend WM forte 108 kilo litres and vitablend AD3, Vitablend AD3 Forte and vitablend AM. 2-D3 89 tonnes.
Licence No. & Date: IL: 32/87 dt. 6.5.87.

JUNE 1987

MANISH ORGANICS INDIA LTD., 1, National Chambers, Ashram Road, Ahmedabad. (NA).
Product & Annual Capacity: Acetaldehyde 3,600 tonnes.
Licence No. & Date: CIL: 217/87 dt. 5.6.87.

HOECHST INDIA LTD., Hoechst House, Nariman Point, Backbay Reclamation, Bombay. (NU).
Product & Annual Capacity: Isoproturon 400 tonnes.
Licence No. & Date: CIL: 220/87 dt. 9.6.87.

HINDUSTAN LEVER LTD., Hindustan Lever House, 165/166, Backbay Reclamation, Bombay. (NU).
Product & Annual Capacity: Synthetic detergents 30,000 tonnes.
Licence No. & Date: CIL: 231/87 dt. 22.6.87.

SANDOZ (I) LTD., Sandoz House, Dr. A.B. Road, Worli, Bombay. (NU).
Products & Annual Capacity: Fat liquors 1,200 tonnes, synthetic tanning agents 400 tonnes, leather processing chemicals 1,000 tonnes and leather finishing chemicals 1,400 tonnes.
Licence No. & Date: CIL: 230/87 dt. 18.6.87.

HARYANA LEATHER CHEMICALS LTD., 2, Tribune Colony, Ambala Cantt., Haryana. (NU).
Products & Annual Capacity: Leathe chemicals and auxiliaries: Fat liquors, N lacquers, base coats, compact dyes, an pigments etc. 1,500 tonnes.
Licence No. & Date: CIL: 229/87 d 18.6.87.

GUJARAT STATE FERTILISERS CO LTD., Polymers Unit, P.O. Fertilizemagar, Vadodara, Gujarat. (NA).
Product & Annual Capacity: Methacrylic acid 500 tonnes.
Licence No. & Date: CIL: 212/87 dt. 3.6.87

HOECHST INDIA LTD., Hoechst House, Nariman Point, Backbay Reclamation Bombay. (NU).
Products & Annual Capacity: Natrafen (cyclopiroxolamine) and formulations based thereon 2 tonnes.
Licence No. & Date: CIL: 219/87 dt. 5.6.87

RANBAXY LABORATORIES LTD. Devika Tower, 6, Nehru Place, New Delhi. (NU).
Products & Annual Capacity: Ranitidine bulk drug 3 tonnes and ranitidine formulations 2.1 tonnes.
Licence No. & Date: CIL: 240/87 dt. 29.6.87.

PEFCO INDUSTRIES LTD., E-14 & 15, Bosari Industrial Area, Pune. (NA).
Product & Annual capacity: D-Naproxen 10 tonnes.
Licence No. & Date: CIL: 211/87 dt. 3.6.87.

JULY 1987

PORWAL CARBIDE (P) LTD., 60, HIG Heshangabad Road, Bhopal-16. (COB).
Product & Annual Capacity: Calcium carbide 1,500 tonnes.
Licence No. & Date: IL: 43/87 dt. 17.7.87.

EASTERN ELECTRO-CHEMICAL INDUS., 14, Nadir Colony, Shamla Hills, Bhopal. (COB).
Product & Annual Capacity: Calcium carbide 1,800 tonnes.
Licence No. & Date: IL: 42/87 dt. 17.7.87.

HINDUSTAN CIBA-GEIGY LTD., 14, Jamshedji Tata Road, Bombay 400 020. (NA).
Product & Annual Capacity: Speciality hardners 25 tonnes.
Licence No. & Date: CIL: 251/87 dt. 13.7.87.

NATIONAL PEROXIDE LTD., Neville House, J.N. Heredia Marg, Ballard Estate

Bombay 400 038. (SE).
roduct & Annual Capacity: Hydrogen peroxiee (35% W/W) 12,000 tonnes.
cence No. & Date: CIL: 258/87 dt. 16.7.87.

IUKUMCHAND JUTE AND INDUSTRIES LTD., (Chemicals Division), 15, India Exchange Place, Calcutta-1. (NU).
roduct & Annual Capacity: Trichloroethylene 5,000 tonnes.
Licence No. & Date: CIL: 275/87 dt. 27.7.87.

KANORIA CHEMICALS & INDUSTRIES LTD., 16-A, Brabourne Road, Calcutta-1. (NA/SE).
Products & Annual Capacity: (1) Pentaerythritol (SE) 3,000 tonnes (after expansion) and (2) sodium formate (by-product) (NA) 1,650 tonnes.
Licence No. & Date: CIL: 272/87 dt. 24.7.87.

JKBM LTD., 2, Mangoe Lane, Calcutta-1. (NA).
Product & Annual Capacity: Butachlor (technical) and its formulations 200 tonnes.
Licence No. & Date: CIL: 254/87 dt. 14.7.87.

MODIPON LTD., Modinagar-4, Uttar Pradesh. (SE).
Product & Annual Capacity: Nylon industrial yarn/tyre cord 4,000 tonnes (after expansion).
Licence No. & Date: CIL: 252/87 dt.14.7.87.

SANDOZ (I) LTD., Sandoz House, Dr. A.B. Road, Worli, Bombay-18. (NA).
Product & Annual Capacity: 1,2-Dihydro-2-oxoquinoxaline for captive consumption 300 tonnes.
Licence No. & Date: CIL: 241/87 dt. 6.7.87.

AUGUST 1988

MANALI PETROCHEMICALS LTD., Kothari Building, Nungambakkam High Road, Madras. (NA).
Product & Annual Capacity: Propylene oxide 12,000 tonnes.
Licence No. & Date: CIL: 296/87 dt. 21.8.87.

HINDUSTAN LEVER LTD., Hindustan Lever House, 165/166, Backbay Reclamation, Bombay. (NU).
Product & Annual Capacity: Plant growth nutrient 2,000 tonnes.
Licence No. & Date: CIL 295/87 dt. 21.8.87.

PYRAPURE CHEMICALS LTD., Khetan Bhavan, 3rd Floor, 198, J. Tata Road, Bombay. (NU).
Product & Annual Capacity: Decamethrin technical 20 tonnes.
Licence No. & Date: CIL: 280/87 dt. 3.8.87.

RANBAXY LABORATORIES LTD., Sahibzada Ajit Singh Nagar, Dist. Ropar, Punjab. (NA).
Products & Annual Capacity: Pentazocine (bulk drug) 3,000 kgs. (i) Drug formulations (based on bulk drug production of pentazocine in tablets and injectables) 1,650 kgs. (ii) Pentazocine HCl (equivalent to pentazocine base-15 mg) 450 kgs. and (iii) paracetamol 13,230 kgs.
Licence No. & Date: CIL: 292/87 dt. 18.8.87.

SEPTEMBER 1987

EAST COAST FERTILISERS & CHEMICALS LTD., Kalma, Dist. Mayurbhanj, Orissa 757 082. (SE).
Products & Annual Capacity: Single superphosphate 66,000 tonnes and sulphuric acid 33,000 tonnes (after expn.).
Licence No. & Date: CIL: 309/87 dt. 3.9.87.

CHEMICALS & PLASTICS INDIA LTD., 8, Cathedral Road, Madras 600 086. (NU).
Product & Annual Capacity: Water treatment chemicals etc. 5,000 tonnes.
Licence No. & Date: CIL: 324/87 dt. 18.9.87.

RALLIS INDIA LTD., Ralli House, 21, D.S. Marg, Bombay 400 001. (NU).
Product & Annual Capacity: Acephate (orthene) 100 tonnes.
Licence No. & Date: CIL: 322/87 dt. 14.9.87.

AMBALAL SARABHAI ENTERPRISES LTD., Unit: Standard Pharmaceuticals, Wadi, Baroda 390 007. (NA).
Products & Annual Capacity: Stancillin injections (formulations of 250/500 mg) 8.35 lakh nos.
Licence No. & Date: CIL: 306/87 dt. 2.9.87.

PLATEWAL PROCESSES & CHEMICALS, Padra Road, Atladra, Baroda 390 012. (COB).
Products & Annual Capacity: Free and sodium saccharine 10 tonnes.
Licence No. & Date: IL: 55/87 dt. 28.9.87.

OCTOBER 1987

HINDUSTAN CIBA-GEIGY LTD., 14, J. Tata Road, Bombay 400 020. (NA).
Product & Annual Capacity: Ammonium chloride 200 tonnes.
Licence No. & Date: CIL: 348/87 dt. 13.10.87.

ORIENTAL CARBON & CHEMICALS LTD., Duncan House, 31, Netaji Subhas Road, Calcutta 700 001. (SE).
Products & Annual Capacity: Sulphuric acid 33,000 tonnes (after expn.), stabilised liquid sulphur trioxide 33,000 tonnes (after expn.), and oleum 65% and 24% 7,800 tonnes (after expn.).
Licence No. & Date: CIL: 357/87 dt. 28.10.87.

AMBALAL SARABHAI ENTERPRISES LTD., (Unit: Standard Pharmaceuticals), 24, Park Street, Calcutta 700 016. (NA).
Product and Annual Capacity: Ampicillin cloxacillin capsules (formulations of) 40 lakh nos.
Licence No. & Date: CIL: 349/87 dt. 13.10.87.

STANDARD PHARMACEUTICALS LTD., 24, Park Street, Calcutta 700 016. (NA).
Products & Annual Capacity: Tetramisole (bulk drug) 1 tonne and tetramisole tablets 500 kgs in terms of bulk drug.
Licence No. & Date: CIL: 347/87 dt. 13.10.87.

INDIAN DAIRY CORPN., Suraj Plaza II, Magan Wadi, Sayaji Ganj, Baroda 390 005. (NA).
Products & Annual Capacity: Vitamin mixes for milk powder, baby-foods, consumer food products, animal feeds, poultry feeds, general food products 40,000 kgs.
Licence No. & Date: CIL: 354/87 dt. 20.10.87.

CYANAMID INDIA LTD., Nyloc House, 254-D2, Dr. A.B. Road, Worli, Bombay 400 025. (NA).
Products & Annual Capacity: Bisphenol 23 kgs., and trihexyphenidyl 175 kgs.
Licence No. & Date: CIL: 335/87 dt. 7.10.87.

MOGEMS INDIA, (Prop. Mewar Oil & General Mills Ltd.), Udaisagar Road, Udaipur 313 001. (NA)
Product & Annual Capacity: 6-Amino

[illegible] and 8- tonnes.

Licence No. & Date: CIL: 343/87 dt. [illegible]

NOVEMBER 1987

SOUTHERN PETROCHEMICAL INDS. CORPN. LTD., 97, Armenian Street, Madras 600 001. (SE)

Products & Annual Capacity: DAP (diammonium phosphate) (DAP-I): Additional capacity 1.45 lakh tonnes equal to 48,000 tonnes of P_2O_5 by retrofitting of the DAP-I chain.

Licence No. & Date: CIL: 388/87 dt. 25.11.87.

VIDARBHA PHOSPHATE & FERTILISERS LTD., Tamarinds, Katol Road, Nagpur 440 013. (NU)

Products & Annual Capacity: Single superphosphate 66,000 tonnes and sulphuric acid (for captive consumption) [illegible] tonnes.

Licence No. & Date: CIL: 381/87 dt. 28.11.87.

KINETIC METALS LTD., Panchanan, 2nd Floor, Malviyanagar, Bhopal 462 003. (NU)

Product & Annual Capacity: Aluminium powder (explosive grade) 2,000 tonnes.

Licence No. & Date: CIL: 379/87 dt. 24.11.87.

ARLABS LTD., No. 6, 2nd Floor, Malhotra House, Opp. G.P.O., Bombay 400 001. (NA)

Product & Annual Capacity: Ferro alerate technical 200 tonnes.

Licence No. & Date: CIL: 382 dt. 25.11.87.

DYNO INDIA LTD., 12th Floor, Nirmal, Nariman Point, Bombay 400 021. (NA)

Products & Annual Capacity: Detonating fuse 1,50,00,000 mtrs, cast boosters 75 tonnes and pentaerythritol tetra nitrate 300 tonnes.

Licence No. & Date: CIL: 384/87 dt. 25.11.87.

RANBAXY LABORATORIES LTD., 19 Nehru Place, New Delhi 110 019. (SE)

Products & Annual Capacity: (1) Semi-synthetic penicillins including amoxicillin, [illegible] sodium (for injection) 1,000 [illegible] (2) [illegible]

Licence No. & Date: CIL: 380/87 dt. 24.11.87.

TAMIL NADU DADHA PHARMACEUTICALS LTD., Madras 600 086. (NA)

Products & Annual Capacity: Ampicillin sodium 17 tonnes and chloramphenicol succinate sodium 75 quintals.

Licence No. & Date: CIL: 386/87 dt. 26.11.87.

SERUM INSTITUTE OF INDIA (P) LTD., 212/2, Pune-Sholapur Road, Hadapsar, Pune-411 028. (NU)

Products & Annual Capacity: Bacterial vaccine combinations including the following: (1) Tetanus toxoid (TT) 11,54,00,000 doses, (2) Dual antigen (DT) 85,00,000 doses, (3) Triple antigen (DPT) 11,40,00,000 doses, (4) Quadruple (DPTP) 13,00,000 doses. Anti-sera vaccine (equines) combinations including the following: (5) Tetanus antitoxin 5,700 MU, (6) Anti-snake venom 3,00,000 doses, (7) Anti-D Rho immunoglobulin 220 MU, (8) Tetanus immunoglobulin human 100 MU (9) Human normal immunoglobulin 685 kg, (10) Histoglobulin 15,60,000 doses, (11) Human albumin serum 2,250 kgs., (12) Factor VIII concentrate calf 2 MU, (13) Fibrinogen factor 1500 gms., (14) Prothrombin complex (II, VII, IX & X) 10 MU, (15) Rabies immunoglobulin 3,75,00,000 units, (16) Plasma protein fraction (human serum) 100. Viral vaccine and combinations including the following: (17) Inactivated rabies vaccine (tissue culture) 36,00,000 doses, (18) Hepatitis vaccine 4,00,000 doses (19) Measles vaccine 20 MU and (20) Measles, mumps & rubbela vaccines 1 MU.

Licence No. & Date: CIL: 378/87 dt. [illegible]

DECEMBER 1987

ATUL PRODUCTS LTD., The Arvind Asoka Aruna Mills Hospitals Premises, Near Asoka Mills Ltd., Naroda Road, Ahmedabad 380 025. (NA)

Product & Annual Capacity: Tetradifon technical 50 tonnes.

Licence No. & Date: CIL: 394/87 dt. 7.12.87.

[illegible] SYNTHETICS LTD., [illegible]

Products & Annual Capacity: [illegible]

Licence No. & Dat
17.12.87

JCT FIBRES LTD.,
Hoshiarpur, Punjab

Product & Annual
Staple fibre 30,000

Licence No. & Dat
8.12.87

HINDUSTAN CIBA-
Tata Road, Bombay

Product & Annual
(diclofenac sodium)
and voveran base
tonnes.

Licence No. & Dat
9.12.87.

HINDUSTAN CIBA-
Tata Road, Bombay

Products & Annual
(bulk drug) 10 tonn
mulations 5 tonnes.

Licence No. & Date
11.12.87.

JANUARY 1988

KANORIA CHEMI
LTD., Park Plaza, 7
cutta 700 016. (NA

Product & Annual C
hyde (for captive us

Licence No. & Date: C

BHANSALI ENGG. F
706, Dalamal Tow
Bombay 400 021. (

Products & Annual C
[illegible]
granules 6,000 tonn

Licence No. & Date:
27.1.88

SHRI RAM FIBRES L
[illegible]
Delhi 110 [illegible]

Products & Annual C
bon refrigerant ga
[illegible]
[illegible]
tonnes.

Licence No. & Date: C

TRANSPEK INDUS
[illegible]

Product & Annual Cap
[illegible]

Bombay 400 025

Capacity: Dye inter-
cleaves acid, tobias
sulpho tobias acid, ben-
phthol, J acid, phenyl
acid, G acid, N methyl
and K acid 920 tonnes
: IL 4/88 dt. 19.1.88

INDIA LTD., G-3,
avan, Bahadur Shah
[illegible]
Capacity: Baby dia-
pers
CIL 2/88 dt. 5.1.88

ICS CO. LTD., C/o.
aji Subhas Road, 8th
[illegible]
Capacity: p-Nitrochlo-
[illegible]
[illegible], dinitrobenzene 300
[illegible]chlorobenzene 300

CIL 25/88 dt. 4.2.88

HEMICALS LTD.,
37-A, Kirampudi Lay-
530 023, A.P. (COB)
apacity: Alum 13,150

CIL 15/88 dt. 26.2.88

LTD., 9, Waterloo
00 069 (SE)
apacity: Synthetic fil
ng industrial yarn/tyre
(addl.)
CIL 24/88 dt. 29.1.88

A LTD., 8, Cathedral
[illegible]
pacity: Thermoplas-
polyurethane resin

CIL [illegible]

LTD., 8, Cathedral
[illegible]
Capacity: Poly[illegible]
[illegible]

(DEL).
Licence No. & Date: CIL 32/88 dt. 23.2.88

PASUPATI ACRYLON LTD., D-25 Connaught Place, New Delhi 110 001 (DEL).
Product & Annual Capacity: Acrylic fibre 12,000 tonnes
Licence No. & Date: CIL 34/88 dt. 29.2.88

ATUL PRODUCTS LTD., The Arvind Asoka Aruna Mills Hospital Premises, Near Asoka Mills Ltd., Naroda Road, Ahmedabad 380 025 (GUJ).
Product & Annual Capacity: Mebendazole 20 tonnes
Licence No. & Date: CIL 27/88 dt. 5.2.88

AMBALAL SARABHAI ENTERPRISES LTD., Wadi Wadi, Baroda 390 007 (GUJ).
Products & Annual Capacity: Doxycycline and its formulations 5 tonnes
Licence No. & Date: CIL 29/88 dt. 12.2.88

MARCH 1988

ATUL PRODUCTS LTD., The Arvind Asoka Aruna Mills Hospital Premises, Near Asoka Mills Ltd., Naroda Road, Ahmedabad 380 025 (GUJ).
Products & Annual Capacity: [illegible] 400 tonnes and [illegible] 100 tonnes
Licence No. & Date: CIL [illegible]

CREWE CHEMICALS INDIA (P) LTD., 3467, 14th Main Road, Indira Nagar, Bangalore 560 038 (KAR).
Products & Annual Capacity: Butachlor 300 tonnes, simazine/atrazine 50 tonnes, diuron 40 tonnes and [illegible] 10 tonnes
Licence No. & Date: CIL [illegible]

GUJARAT FLUOROCHEMICALS LTD., A-6, Connaught Place, New Delhi 110 001 (DEL).
Products & Annual Capacity: Chlorofluorocarbon refrigerant gases etc. 5,000 tonnes and anhydrous hydrofluoric acid 2,200 tonnes
Licence No. & Date: CIL [illegible]

APRIL 1988

BASF INDIA LTD., Maybaker House, S.K. Ahire Marg, Bombay 400 025 (MAH).
Product & Annual Capacity: Pour Point Depressants 2,500 tonnes
Licence No. & Date: CIL 73/88 dt. 11.4.88

FOR YOUR REQUIREMENTS OF

- * EMULSIFYING WAX
- * BEES WAX Yello/White
- * PETROLEUM JELLY (White/Yellow)
- * MONTON WAX
- * CARNUBA WAX
- * All Kinds of Micrycrystalline Waxes
- * Also WAXES for Rubber, Plastics, Textiles, Electronics Industries

Please Contact

QUALITY CHEMICAL INDUSTRIES

Manufacturers & Importers of Waxes, Chemicals & Solvents

[illegible]
[illegible]
[illegible]

VINYL CHEMICAL (INDIA) LTD., Ramkrishna Mandir Road, Off M. Vasanji Road, Andheri (East), Bombay 400 059 (NU).
Product & Annual Capacity: Vinyl acetate monomer 10,000 tonnes.
Licence No. & Date: CIL: 86/88 dt. 20.4.88.

IFB AGROINDUSTRIES LTD., 33N, Block-B, New Alipore, Calcutta 700 053. (NU).
Products & Annual Capacity: (1) Extra neutral alcohol (96.5%) (industrial alcohol for use in the mfg. of chemical items and pharmaceuticals and homeopathic industry) 1,50,00,000 litres; (2) Technical alcohol (90% as by-product) (industrial alcohol for use in the manufacture of chemical items and pharmaceutical and homoeopathic industry) 9,00,000 litres; (3) sludge fertiizers as by-product 12.5 quintals and (4) cattle feed as by-product 62,500 tonnes.
Licence No. & Date: CIL: 87/88 dt. 26.4.88.

DCL POLYESTERS LTD., FF-1, Uday Apartments, 4, Vijaynagar Chaaroni, Nagpur 440 013. (NU).
Product & Annual Capacity: Polyester filament yarn 15,000 tonnes.
Licence No. & Date: CIL: 78/88 dt. 12.4.88.

HINDUSTAN DEVELOPMENT CORPORATION LTD., Mody Buildings, 27, R.N. Mukherjee Road, Calcutta 700 001. (NU).
Product & Annual Capacity: Diphenyl guanidine 300 tonnes.
Licence No. & Date: CIL: 70/88 dt. 5.4.88.

ESTER INDIA LTD., 75-76, Amrit Nagar, Behind NDSE-1, New Delhi 110 003. (SE).
Product & Annual Capacity: Polyester film (general purpose, balanced and tensilised) 4,000 tonnes.
Licence No. & Date: CIL: 88/88 dt. 26.4.88.

SCHENECTADY CHEMICALS (I) PVT. LTD., Plot 20, N.S. Road No. 9, JVD Scheme, Bombay 400 049. (NU).
Product & Annual Capacity: Electrical grade wire enamels and insulation varnishes 1,500 tonnes.
Licence No. & Date: CIL: [illegible]/88 dt. 11.4.88.

LETTERS OF INTENT

MARCH 198[illegible]

[illegible] SUPERPHOSPHATES & CHEMI[illegible] [illegible] Hemkunt [illegible] Nehru Place, New Delhi 110 019. (NA).
Products & Annual Capelty: Single super phosphate 2,06,250 tonnes and sulphuric acid 74,400 tonnes.
Letter of Intent No. & Date: LI: Fert. 4/87 dt. 31.3.87.

ORIENTAL CARBON & CHEMICALS LTD., 5th Floor, 506, Sahyog Building, 58, Nehru Place, New Delhi 110 019. (NA).
Product & Annual Capacity: Insoluble sulphur 5,000 tonnes.
Letter of Intent No. & Date: LI: 127/87 dt. 31.3.87.

HINDUSTAN PETROLEUM CORPN. LTD., 17, Jamshedji Tata Road, Bombay. (NA).
Product & Annual Capacity: Propylene 23,000 tonnes.
Letter of Intent No. & Date: LI: 126/87 dt. 31.3.87.

THE PRAVARA SAHAKARI SAKHAR KARKHANA LTD., Pravaranagar, Taluka Srirampur, Ahmednagar, Maharashtra 413 112. (NA).
Products & Annual Capacity: Acetaldehyde 3,000 tonnes and ethyl acetate recovered as by-product 600 tonnes.
Letter of Intent No. & Date: LI: 119/87 dt. 27.3.87.

GHARDA CHEMICALS PVT. LTD., 48, Hill Road, Bandra West, Bombay 400 050. (NA).
Product & Annual Capacity: Chlortoluron 1,000 tonnes.
Letter of Intent No. & Date: LI: 117/87 dt. 26.3.87.

SHRI SAROJ KUMAR PODDAR, Hongkong House, 31, Dalhousie Square South, Calcutta 700 001. (NU).
Product & Annual Capacity: Polybutones 5,000 tonnes.
Letter of Intent No. & Date: LI: 116/87 dt. 26.3.87.

ASIAN PAINTS (I) LTD., Nirmal, 5th Floor, Nariman Point, Bombay 400 021. (NU).
Product & Annual Capacity: Paints, varnishes and enamels 23,000 tonnes and synthetic resins (for captive consumption) 6,550 tonnes.
Letter of Intent No. & Date: LI:103/87 dt. 17.3.87.

THE RAYMOND WOOLLEN MILLS LTD., [illegible]2, Ashok Estate, 24, Barakhamba Road, New Delhi 110 0
Product & Annual Capacity: P
ament yarn 15,000 tonnes.
Letter of Intent No. & Date: LI
19.3.87.

SHREE SYNTHETICS LTD.,
Maksi Road, Ujjain 456
Product & Annual Capacity: P
ament yarn 15,000 tonnes
Letter of Intent No. & Date: LI
12.3.87.

KURUNCHI CHEMICALS PV
21-C, Sarda College Road, Sa
007, Tamil Nadu. (NU).
Products & Annual Capacity: E
solvent grade 300 tonnes, eth
anaesthetic grade 300 tonnes a
acetate 1,950 tonnes.
Letter of Intent No. & Date: LI:
12.3.87.

SOUTHERN NITROCHEM
LTD., 86, Attipet Village, A
Madras 600 058. (NA).
Product & Annual Capacity:
nitrite 3,000 tonnes.
Letter of Intent No. & Date: LI
6.3.87.

HINDUSTAN ORGANIC CHE
LTD., P.O. Rasayani 410 2
Raigad, Maharashtra. (NA).
Product & Annual Capacity: 4'4
methane di-isocyanate 10,000 t
Letter of Intent No. & Date: LI
31.3.87.

THE BOMBAY OIL INDUSTRI
LTD., 281/287, Narsi Natha
Bombay 400 009. (NU).
Products & Annual Capacity: (
halides like chlorides and bro
dodecane tetradecane, propane a
400 tonnes, (2) flame retardants 5
(3)Antioxidants (excluding addi
tonnes, (4) anticking agents 20
and (5) Industrial biocides 500
Letter of Intent No. & Date: LI:
6.3.87.

MANISH BROTHERS LTD.,
Meenakshi Garden, New Delhi 1
(NU).
Products & Annual Capacity:
essential oils, oleo resins, res
perfumery compounds 130 to
Letter of Intent No. & Date: LI F
dt. 6.3.87.

NAVIN CHEMICALS MFG. &

D., 2, Nizamuddin East, New
013. (NA).
Annual Capacity: Oil and well
such as: Pour point depres-
paraffinic flow improver 1,200
Oil production chemicals such as
emulsifier, corrosion inhibi-
inhibitors, acid inhibitors, [illegible]
flocculant, coagulant, [illegible]
H_2S scavenger and oxygen
1,800 tonnes; Mud chemicals
spotting fluids/stuck pipe releaser
and EP lubricant, mud lubri-
ing and detergent.
Intent No. & Date: LI: PAB: 8/87
87.

PENDRA KUMAR, 3-6-361/
Hyderabad 500 029,
Pradesh. (NU).
& Annual Capacity: Intravenous
00,000 bottles of 450 ML capac-
ity
Intent No. & Date: LI: 120/87 dt.

S PETROCHEMICAL INDS.
LTD., 97, Mount Road,
Madras 600 002. (NU).
& Annual Capacity: 6-APA 150

Intent No. & Date: 99/87 dt.

YNCHROME LTD., 1-2-93/36,
Colony, Hyderabad 500
& Annual Capacity: Sodium
20 tonnes.
Intent No. & Date: LI: 82/87 dt.

RAJU, 3-1-26/4/3, Ameerpet,
bad 500 016. (NU).
& Annual Capacity: Pancreatin
30 tonnes and formulations
pancreatin only upto 70% of
Intent No. & Date: LI: SAC:NRI:
113/87

AL PRADESH MINERAL &
TRIAL DEVT. CORPORA-
LTD., Himrus, Circular Road,
171 001. (NU).
& Annual Capacity: Immobilised
20 tonnes, 6-APA 100 tonnes
DCA 100 tonnes.
Intent No. & Date: LI: PAB: 5/87
87.

APRIL 1987

DEEPAK FERTILIZERS & PETROCHEMICALS CORPN. LTD., Shivshakti, B.G. Kher Road, Worli, Bombay 400 018. (NA).
Product & Annual Capacity: 23:23:0 grade ammonium nitrophosphate [illegible] tonnes.
Letter of Intent No. & Date: LI: FERT/5/87 dt. 3.4.87.

GHARDA CHEMICALS PVT. LTD., 48, Hill Road, Bandra West, Bombay 400 050. (NA).
Product & Annual Capacity: Anilofos 1000 tonnes.
Letter of Intent No. & Date: LI: 200/87 dt. 30.4.87.

DCW LTD., Nirmal, 3rd Floor, Nariman Point, Bombay. (NU).
Product & Annual Capacity: Titanium dioxide 50,000 tonnes.
Letter of Intent No. & Date: LI: 155/87 dt. 3.4.87.

THE ATUL PRODUCTS LTD., Post Atul, Dist. Bulsar, Gujarat (NA).
Product & Annual Capacity: [illegible] technical 500 tonnes.
Letter of Intent No. & Date: LI: 154/87 dt. 3.4.87.

HOMI D. MEHTA, 47, Sir Ratan Tata Building, [illegible] S.V. Road, Bandra, Bombay. (NU).
Products & Annual Capacity: PVC/PU coated fabrics 3,600 kms.
Letter of Intent No. & Date: LI: [illegible] dt. 3.4.87.

HINDUSTAN GAS & INDS. LTD., Industry Hse., 10 Camac St., Calcutta [illegible]
Products & Annual Capacity: Oxygen 20,000 tonnes, nitrogen 70,000 [illegible], argon 8,01,000 cu. mtrs., speciality gas and gas mixtures 1,00,000 cu. mtrs. and helium/neon mixtures 2,00,000 litres.
Letter of Intent No. & Date: LI: 205/87 dt. 30.4.87.

RAJASTHAN GLYOXAL LTD., 208, Bakshi House, 40-41, Nehru Place, New Delhi. (NA/SE).
Products & Annual Capacity: Glyoxal 3,000 tonnes (after expan.); by-product [illegible] 250 tonnes and [illegible] 1,250 tonnes (after expan.)

TOYOTA OFFERS

ACRION EXCHANGE
RESINS FOR YOUR
WATER TREATMENT

CATION & ANION
EXCHANGE RESINS

Contact

TOYOTA CHEMICAL
INDUSTRIES (P) LTD.

DEEPAVALI, S.V. ROAD, ANDHERI (W)
BOMBAY 400 058

Phones: [illegible]

Letter of Intent No. & Date: LI: 204/87 dt. 30.4 87

MACWIN EXPLOSIVES & ACCESSORIES (P) LTD., 24/2, Ulsoor Road, 1st Cross, Bangalore-42. (SE).
Products & Annual Capacity: Pentaerythritol 200 tonnes (after expn.) and tetra nitrate detonating fuse 1,00,00,000 metres (after expn.).
Letter of Intent No. & Date: LI: 202/87 dt. 30.4.87.

GUJARAT STATE FERTILIZERS CO. LTD., P.O. Fertilizer Nagar, Dist. Baroda, Gujarat. (SE).
Products & Annual Capacity: Caprolactam 1,20,000 tonnes (after expn.) and ammonium sulphate as by product 5,06,000 tonnes (after expn.).
Letter of Intent No. & Date: LI: 194/87 dt. 28.4.87.

ASHOK ORGANIC INDUS. LTD., 406, Sharda Chambers, 33, New Marine Lines, Bombay 400 020. (NA).
Product & Annual Capacity: Ethyl acetate 900 tonnes.
Letter of Intent No. & Date: LIP 135/87 dt. 6.4.87.

EID-PARRY (I) LTD., Dare House, 234, NSC Bose Road, Madras 600 001. (NA).
Products & Annual Capacity: Formulations of dimethoate in substitution of endrin and manufacture of formulations of monocrotophos in place of morocide (Binapcryl) within the existing licensed capacity.
Letter of Intent No. & Date: LI: 181/87 dt. 21.4.87.

RELIANCE INDUSTRIES LTD., 3rd Floor, Maker Chambers IV, 222, Nariman Point, Bombay 400 021. (NA).
Products & Annual Capaity: Chlorine 66,000 tonnes, caustic soda (by-product) 78,000 tonnes and hydrogen (by-product) 1,950 tonnes.
Letter of Intent No. & Date: LI: 156/87 dt. 3.4.87.

VAM ORGANIC CHEMICALS LTD., Skyline House, 3rd Floor, 85, Nehru Place, New Delhi 110 019. (NU).
Products & Annual Capacity: Fluid catalytic cracking (FCC) 5,000 tonnes, oxidation catalyst 100 tonnes, dehydration catalyst 250 tonnes, pollution catalyst 3,000 tonnes and precious me[illegible] [illegible]ts 150 tonnes.
Letter of Intent No. & Date: LI: 139/8[illegible] 10.4.87.

JAYALAKSHMI OIL & CHEMICALS INDUSTRIES LTD., Dokiparru, Guntur, Andhra Pradesh. (SE).
Products & Annual Capacity: Fatty acids 20,000 tonnes (after expn.) and glycerine 20,000 tonnes (after expn.).
Letter of Intent No. & date: LI: 147/87 dt. 14.4.87.

ATIC INDUSTRIES LTD., Post: Atul, Dist. Valsad, Gujarat. (SE).
Product & Annual Capacity: Disperse dyes 522 tonnes (after expn.).
Letter of Intent No. & Date: LI: 198/87 dt. 24.4.87.

INDIAN IMMUNOLOGICALS, 11-4-657, Lakdi-ka-Pul, Hyderabad-4, Andhra Pradesh. (NA).
Product & Annual Capacity: Rabies vaccine 10,00,000 doses.
Letter of Intent No. & Date: LI: 146/87 dt. 3.4.87.

DR. P. RAVINDRANATH, 6-3-862, Ameerpet, Hyderabad-16. (NU).
Products & Annual Capacity: High potency liver extract formulations based on liver extract only 2,000 litres upto 70% of their own bulk drug production.
Letter of Intent No. & Date: LI: SAC/NRI/6/87 dt. 27.4.87.

RANBAXY LABORATORIES LTD., 19, Nehru Place, New Delhi 110 019. (SE).
Products & Annual Capacity: Nalidixic acid bulk drug 24,000 kgs. (after expn.) and nalidixic acid formulations 16,800 kgs. (after expn.).
Letter of Intent No. & Date: LI: 145/87 dt. 30.4.87.

BIRLA EASTERN LTD., F-45, South Extension, Part I, New Delhi 110 049. (NU).
Products & Annual Capacity: Mono sodium glutamate 3,000 tonnes.
Letter of Intent No. & Date: LI: 148/87 dt. 14.4.87.

MAY 1987

KERALA SOAPS & OILS LTD., Gandhi Road, Calicut 873 001, Kerala. (NA).
Product & Annual Capacity: Distilled RBHT fatty acid 5,400 tonnes.
Letter of Intent No. & Date: LI: 219/87 dt. 12.5.87.

SANDOZ (INDIA) LTD., Sandoz House, Dr. Annie Besant Road, Worli, Bomba 400 018. (NA).
Product & Annual Capacity: Oil fie chemicals 3,000 tonnes.
Letter of Intent No. & Date: LI: 241/87 d 12.5.87.

REGENT CHEMICALS LTD., 608, Dalamal House, Nariman Point, Bombay 400 021. (NU).
Products & Annual Capacity: 7-ADCA 40 tonnes; cephalexin BP and its formulations 52 tonnes; cephalosporinic zinc complex 100 tonnes; cefuroxime BP serile 15 tonnes and cefazoline BP and its formulations 15 tonnes.
Letter of Intent No. & Date: LI: PAB/16/87 dt. 4.5.87.

JUNE 1987

MODIPON LTD., Modinagar 201 204, Uttar Pradesh. (SE).
Product & Annual Capacity: Polyester filament yarn 15,000 tonnes (after expn.)
Letter of Intent No. & Date: LI: 377/87 dt. 26.6.87.

RALLIS INDIA LTD., United India Life Bldg., F-Block, Connaught Place, New Delhi 110 001. (SE).
Product & Annual Capacity: Fenvalerate technical 200 tonnes (after expn.).
Letter of Intent No. & Date: LI: 376/87 dt. 26.6.87.

INDIAN SULPHACID INDS. LTD., G.T. Road,, P.O. Shahabad Markanda, Dist. Kurushetra, Haryana. (SE).
Product & Annual Capacity: Alumina ferric 24,000 tonnes (after expn.).
Letter of Intent No. & Date: LI: 364/87 dt. 25.6.87.

HINDUSTAN ORGANIC CHEMICALS LTD., P.O. Rasayani, Dist. Raigad, Maharashtra-410 207. (SE).
Product & Annual Capacity: Formaldehyde 30,000 tonnes (after expansion).
Letter of Intent No. & Date: LI: 342/87 dt 25.6.87.

GOODLASS NEROLAC PAINTS LTD., Nerolac House, Nerolac Kadam Marg, Lower Parel, Bombay 400 013. (NU).
Products & Annual Capacity: Paints, varnishes and enamels 15,000 tonnes.
Letter of Intent No. & Date: LI: 338/87 dt. 24.6.87.

THE SOUTHERN PESTICIDES CORP. LTD., 10-5-3/2/2, Masab Tank, Hyderabad 500 028. (NA).

oducts & Annual Capacity: Dichlorvos, methyl parathion, endosulfan, cypermethrin, fenvalerate, malathion, phosphamidon, butachlor, quinalphos, dimethoate, chlorpyriphos, monocrotophos and dicofol 2,322 tonnes.

etter of Intent No. & Date: LI: 375/87 dt. 25.6.87.

TTAR PRADESH CARBIDE & CHEMICALS LTD., 59/4, Rajpur Road, Dehradun 248 001. (NA).

roducts & Annual Capacity: Trichloroethylene and tetrachloroethane 5,000 tonnes.

Letter of Intent No. & Date: LI: 378/87 dt. 19.6.87.

GUJARAT ALKALIES & CHEMICALS LTD., P.O. Petrochemicals 391 346, Dist. Baroda, Gujarat. (NA).

Products & Annual Capacity: Potassium hydroxide 16,500 tonnes and potassium carbonate 15,000 tonnes.

Letter of Intent No. & Date: LI: 336/87 dt. 19.6.87.

JKBM LTD., 2, Mangoe Lane, Calcutta 700 001. (NA).

Product & Annual Capacity: Methyl thiophenates 200 tonnes.

Letter of Intent No. & Date: LI: 335/87 dt. 19.6.87.

SHAW WALLACE & CO. LTD., 4, Bankshall Street, Calcutta. (NA).

Product & Annual Capacity: Acephate technical 200 tonnes.

Letter of Intent No. & Date: LI: 322/80 dt. 16.6.87.

ASHOK V. PATEL, 29, Atmajyoti Nagar Society, Atmajyoti Ashram Road, Opp. Atmajyoti Mandir, Baroda 390 007. (NU).

Products & Annual Capacity: p-Nitro chlorobenzene 1,200 tonnes, o-nitrochloro benzene 600 tonnes and acetanilide 1,200 tonnes.

Letter of Intent No. & Date: LI: SAC:NR: 11/87 dt. 3.6.87.

SURYA AGROIL LTD., 3, Scindia House, Janpath, New Delhi 110 001. (NU).

Products & Annual Capacity: Methyl ester, its derivatives and its sulphonated products 15,000 tonnes and sulphonated surfactants 10,000 tonnes.

Letter of Intent No.: LI: PAB: 20/87 dt. 16.6.87.

APAR PVT. LTD., Maker Chambers III, Jamnalal Bajaj Marg, Nariman Point, Bombay 400 021. (NU).

Product & Annual Capacity: Acrylonitrile butadiene rubbers and latexes 5,000 tonnes.

Letter of Intent No. & Date: LI: 310/87 dt. 8.6.87.

V.V. NATHAN, Intra Metal Pvt. Ltd., 20-A, Basant Lok Complex, Vasant Vihar, New Delhi 110 057. (NU).

Products & Annual Capacity: Lime (of quality other than that for construction and lime wash which is reserved for the small scale sector) 45,000 tonnes.

Letter of Intent No. & Date: LI: 278/87 dt. 15.6.87.

HINDUSTAN ORGANIC CHEMICALS LTD., Rasayani, Dist. Raigad, Maharashtra-410 207. (NA).

Products & Annual Capacity: Epichlorohydrin 5,000 tonnes, hydrochloric acid 16,000 tonnes, 1,2-dichloropropane and 1,3-dichloropropane 500 tonnes and glycerine 4,000 tonnes.

Letter of Intent No. Date: LI: 289/87 dt. 10.6.87.

MODIPON LTD., Modinagar 201 204, Uttar Pradesh. (SE).

Product & Annual Capacity: Nylon filament yarn 12,000 tonnes (after expn).

Letter of Intent No. & Date: LI: 294/87 dt. 3.6.87.

VAM ORGANIC CHEMICALS LTD., Skyline House, 85, Nehru Place, New Delhi 110 019. (NU).

Product & Annual Capacity: Ethylene vinyl acetate 6,000 tonnes.

Letter of Intent No. & Date: LI: 299/87 dt. 5.6.87.

LEM MOHTA AJK LTD., 273, Mysore Road, Bangalore 560 026. (NU).

Products & Annual Capacity: (1) Electronic copper clad laminates, industrial laminates and moulded components 2,750 tonnes, (2) Advanced composites for aero-space 200 tonnes, (3) fire protection compounds 600 tonnes and (4) mica based insulating products 100 tonnes.

Letter of Intent No. & Date: LI: PAB-21/87 dt. 22.6.87.

THE ATUL PRODUCTS LTD., P.O. Atul, Dist. Valsad, Gujarat. (NA).

Products & Annual Capacity: 1,8-Diamino

FOR YOUR REQUIREMENTS OF:

ANTIMONY
TRIOXIDE

[Sb_2O_3]

Contact:

Maheshwar Rang Rasayan

1/3, Issaji Street, Purshottam Bhuvan,
Vadgadi,
BOMBAY 400 003.

Tele: 323704, 328139

naphthalene 80 tonnes and 1,5-diamino naphthalene (by-product) 48 tonnes.
Letter of Intent No. & Date: LI: 296/87 dt. 5.6.87.

VAM ORGANIC CHEMICALS LTD., Skyline House, 85, Nehru Place, New Delhi-19. (NA).
Product & Annual Capacity: Aspirin 2,000 tonnes.
Letter of Intent No. & Date: LI: 321/87 dt. 16.6.87.

AMBALAL SARABHAI ENTERPRISES LTD., Wadi Wadi, Baroda-7. (NA).
Product & Annual Capacity: Diclofenac sodium bulk drug and its formulations 5,000 kgs.
Letter of Intent No. & Date: LI: 339/87 dt. 25.6.87.

FERRO ALLOYS CORPN. LTD., 42, Dakshineshwar, 10, Hailey Road, New Delhi 110 001. (NU).
Products & Annual Capacity: 6-Amino penicillin acid 200 tonnes and ampicillin/amoxycillin trihydrate 135 tonnes.
Letter of Intent No. & Date: LI: 301/87 dt. 5.6.87.

INDIAN ORGANIC CHEMICALS LTD., New Excelsior Building, Wallace Street, Bombay-1. (NA).
Products & Annual Capacity: (1) D(-) phenylglycine base 300 tonnes; (2) D(-) phenylglycine chloride/hydrochloride 400 tonnes; (3) D(-) p-hydroxy-phenylglycine 150 tonnes; (4) D(-) p-hydroxyphenylglycine chloride/hydrochloride 100 tonnes and (5) D(-)p-hydroxyphenyl glycine dane salt 150 tonnes.
Letter of Intent No. & Date: LI: PAPB/19/87 dt. 5.6.87.

PEFCO INDUSTRIES LTD., Plot No. 10, Off Dr. E. Moses Road, Worli, Bombay 400 018. (NA).
Products & Annual Capacity: (1) L-Methyl dopa 15 tonnes, (2) ampicillin trihydrate 15 tonnes, (3) Propanolol hydrochloride 6 tonnes, (4) hydrochloro thiazide 6 tonnes, (5) cephalexin mono hydrate 15 tonnes and trimethoprim 15 tonnes.
Letter of Intent No. & Date: LI:319/87 dt. 30.6.87.

JULY 1987

SANDOZ (I) LTD., Sandoz House, Dr. Annie Besant Road, Worli, Bombay 400 018. (NA)
Product & Annual Capacity: Fluvalinate technical 60 tonnes.
Letter of Intent No. & Date: LI: 454/87 dt. 31.7.87.

EASTER INDIA LTD., 75, Amrit Nagar, Behind NDSE Part I, New Delhi 110 003. (NA).
Products & Annual Capacity: Dope dyed coarse denier polyester filament yarn produced out of recycled polyester film waste 1,200 tonnes.
Letter of Intent No. & Date: LI: 388/87 dt. 15.7.87.

SHRI RAM FIBRES LTD., Express Building, 9-10, Bahadur Shah Zafar Marg, New Delhi 110 002. (NA).
Product & Annual Capacity: Leather auxiliaries (organic chemicals) 500 tonnes.
Letter of Intent No. & Date: LI: 407/87 dt. 23.7.87.

MADRAS REFINERIES LTD., 480, Anna Salai, Nandanam, Madras 600 035. (NA).
Products & Annual Capacity: (1) Ashless dispersants (succinimides) 6,300 tonnes, (2) metallic detergents (calcium phenates) 3,000 tonnes and (3) metallic detergents (calcium sulphonates) 4,000 tonnes.
Letter of Intent No. & Date: LI: 397/87 dt. 20.7.87.

P.K. PATEL, 19-A, Satyawadi Society, Behind Bank of Baroda, Usmanpura, Ashram Road, Ahmedabad 380 013. (SE).
Product & Annual Capacity: Sulphuric acid 66,000 tonnes.
Letter of Intent & Date: LI: 389/87 dt. 15.7.87.

PUNJAB STATE INDUSTRIAL DEVT. CORP. LTD., SCO 54-56, Sector 17-A, Chandigarh 160 017. (NU).
Product & Annual Capacity: Biaxially oriented poly-propylene (BOPP) film 2,000 tonnes.
Letter of Intent No. & Date: 410/87 dt. 24.7.87.

C.K. MEHTA, Deepak Refineries Ltd. (Proposed), 10-B, Bhaktawar, Nariman Pint, Bombay 400 021. (NU).
Products & Annual Capacity: Hysol (emulsifying agent for water and oil) 7,00,000 litres and FW emulsifiers (equipment) 500 nos.
Letter of Intent No. & Date: LI:394/87 dt. 20.7.87.

GLOBAL DRILLING FLUIDS & CHEMICALS INDIA PVT. LTD., Sunlight Building, 1/28, Asaf Ali Road, New Delhi 110 002. (NU).
Products & Annual Capacity: Caustic
nite 1,000 tonnes, resinex equivalent 2,
tonnes and ferro chrome lignosulph
3,500 tonnes.
Letter of Intent No. & Date: LI: 426/87
28.7.87.

LUPIN POLYMERS LTD., 159, C.S
Road, Kalina, Santacruz (E), Bombay 4
098. (NU).
Product & Annual Capacity: Artific
leather based on polyurethane and poly
inyl chloride 40,00,000 meters.
Letter of Intent No. & Date: LI: 425/87
28.7.87.

KAVERI LIME INDUSTRIES (P) LT
Near IBP Petrol Pump, Delhi Road, Sal
ranpur 247 001. (NU).
Products & Annual Capacity: Precipitat
calcium carbonate 3,000 tonnes and ac
vated calcium carbonate 500 tonnes.
Letter of Intent No. & Date: LI: 395/87
20.7.87.

INDIA BREWERY & DISTILLER
LTD., 6-3-1089/A-3, Gulmohar Aven
Rajbhavan Road, Somajiguda, Hyderab
500 482. (NU).
Products & Annual Capacity: Ace
anhydride 1,050 tonnes and n-butyl ac
tate 3,000 tonnes.
Letter of Intent No. & Date: LI: 458/87
31.7.87.

PRADEEP CHANDRA BHANJDE
Mayurbhanj House, 3, Rainey Park, Ca
cutta 700 019. (NU).
Product & Annual Capacity: Lime (
quality other than for construction a
lime wash) 75,000 tonnes.
Letter of Intent No. & Date: LI: 451/87 c
31.7.87.

COCHIN REFINERIES LTD., Post B
No. 2, Ambalamugal 682 302, Ernakula
Dist., Kerala. (NA).
Product & Annual Capacity: Toluer
12,000 tonnes.
Letter of Intent No. & Date: LI: 444/87 c
31.7.87.

POLYOLEFINS INDUSTRIES LTD
Mafatlal Centre, Nariman Point, Bomba
400 021. (NA).
Product & Annual Capacity: Chlorinate
polyethylene 6,000 tonnes.
Letter of Intent No. & Date: LI: 408/87 d
23.7.87.

WEST BENGAL INDUSTRIAL DEV

ORPN. LTD., 23-A, Netaji Subhas oad, Calcutta 700 001. (NU).
ducts & Annual Capacity: Biaxially riented polypropylene films 2,000 nnes.
tter of Intent No. & Date: LI: 443/87 dt. 9.7.87.

ARYANA STATE INDUSTRIAL DEVT. CORPN. LTD., SCO No. 40-41, Sector 17-A, Chandigarh. (NU).
oduct & Annual Capacity: Biaxially oriented polypropylene film 2,000 tonnes.
tter of Intent No. & Date: LI: 436/87 dt. 28.7.87.

AM ORGANIC CHEMICALS LTD., Skyline House, 3rd Floor, 85, Nehru Place, New Delhi 110 019. (NA).
roducts & Annual Capacity: Pentaerythritol 5,000 tonnes and sodium formate (co-product) 1,600 tonnes.
etter of Intent No. & Date: LI: 438/87 dt. 29.7.87.

YAJEERAO COTTON MILLS LTD., (Unit: Saurashtra Chemicals), 2nd Floor, UCO Bank Bldg., Parliament Street, New Delhi 110 001. (SE).
roduct & Annual Capacity: Refined bicarbonate 25,400 tonnes.
etter of Intent No. & Date: LI: 404/87 dt. 20.7.87.

IYAJEERAO COTTON MILLS LTD., (Unit: Saurashtra Chemicals), 2nd Floor, UCO Bank Bldg., Parliament Street, New Delhi 110 001.
roduct & Annual Capacity: Bromine 450 tonnes.
etter of Intent No. & Date: LI: 405/87 dt. 20.7.87.

THE ATUL PRODUCTS LTD., P.O. Atul, (W. Rly), Dist. Bulsar-396 020. (NA).
Products & Annual Capacity: Dimethyl carbonate 40 tonnes, dipropyl carbonate 10 tonnes, diphenyl carbonate and ethylene carbonate 10 tonnes each.
Letter of Intent No. & Date: LI: 409/87 dt. 23.7.87.

VAM ORGANIC CHEMICALS LTD., Skyline House, 3rd Floor, 85, Nehru Place, New Delhi 110 019. (NA).
Product & Annual Capacity: Dimethyl formate 5,000 tonnes.
Letter of Intent No. & Date: LI: 406/87 dt. 23.7.87.

SRINATH RATNAM, Sun Polymers Ltd., TVS Complex, 180, Mount Road, Madras 600 006. (NU).
Products & Annual Capacity: (1) Industrial Coatings: Automotive coatings 3,500 tonnes, can and coil coatings 2,000 tonnes, plastics coatings 500 tonnes and powder coatings 500 tonnes; (2) Electrical insulating varnish enamels, resins and potting compounds 3,000 tonnes; (3) Brake lining/clutch grinding wheel abrasive material/bonding resins 1,500 tonnes; (4) Synthetic sealing and bonding agents 1,200 tonnes, and (5) synthetic resins and intermediates 6,300 tonnes.
Letter of Intent No. & Date: LI: 381/87 dt. 8.7.87.

VIHAAN FILMS LIMITED, 5-9-317, Opp. State Bank, Hyderabad Gunfoundry, Hyderabad 500 001. (NU)
Product & Annual Capacity: Biaxially oriented polypropylene film 2,000 tonnes.
Letter of Intent No. & Date: LI: SAC/NRI/16/87 dt. 22.7.87.

KESAR ENTERPRISES LTD., Oriental House, 7, Jamshedji Tata Road, Churchgate Reclamation, Bombay 400 020. (NA).
Product & Annual Capacity: Cephalexin monohydrate 130 tonnes.
Letter of Intent No. & Date: LI: 439/87 dt. 29.7.87.

HARYANA STATE INDUSTRIAL DEVELOPMENT CORPN. LTD., SCO 40-41, Sector 17-A, Chandigarh 160 017. (NU).
Products & Annual capacity: 7-ADCA 70 tonnes and cephalexin 50 tonnes.
Letter of Intent No. & Date: LI: 399/87 dt. 20.7.87.

SANDOZ (I) LTD., Dr. Annie Besant Road, Worli, Bombay 400 018. (NA).
Products & Annual Capacity: Pindolol and formulations thereof 225 kgs.
Letter of Intent No. & Date: LI: 403/87 dt. 20.7.87.

VIJAY KUMAR GARG, House No. 115, Sector 9-B, Chandigarh. (NU).
Product & Annual Capacity: 3,4,5-Trimethoxy benzaldehyde 200 tonnes.
Letter of Intent No. & Date: LI: 424/87 dt. 28.7.87.

HINDUSTAN ANTIBIOTICS LTD., Pimpri, Pune 411 018. (SE).
Products & Annual Capacity: 6-APA and semi synthetic penicillins 100 tonnes.

FOR
ULTRA
PURE
DISTILLED
WATER

TESTED, APPROVED AND
RECOMMENDED BY GOVERNMENT

CONTACT:
HOLMES LABORATORY
Forjett Hill Road, Bombay - 400 036.
Tel. No. 397176-890675

Letter of Intent No. & Date: LI: 449/87 dt. 31.7.87.

AUGUST 1987

SM DYECHEM LTD., SM House, 11, Sahakar Road, Vile Parle (E), Bombay 400 057. (NA).

Products & Annual Capacity: (1) Man-made fibre preparations -- fibre and yarn lubricants (spin finish oil ranges) 3,000 tonnes. (2) Base for synthetic soap bars (sls needle form) 1,000 tonnes; (3) Super fatting agents for cosmetic preparations 500 tonnes and (4) glycol ethers 1,500 tonnes.

Letter of Intent No. & Date: LI: 477/87 dt. 27.8.87.

HINDUSTAN ORGANIC CHEMICALS LTD., Rasayani, Dist. Raigad, Maharashtra 410 207. (NA).

Products & Annual Capacity: Polyurethane systems/products 10,000 tonnes.

OSWAL FATS & OILS LTD., 36, Regal Building, Connaught Place, New Delhi 110 001. (NU).

Products & Annual Capacity: Fatty stearic acid 10,000 tonnes; hard oil (non edible) 10,000 tonnes; glycerine 9,000 tonnes; toilet soap 10,000 tonnes; and oxygen (industrial) 4,00,000 cu. mtrs.

Letter of Intent No. & Date: LI: 473/87 dt. 27.8.87.

THE PUNJAB STATE INDUSTRIAL DEVELOPMENT CORP. LTD., SC0 34-56, Sector 17A, Chandigarh 160 017. (NU).

Product & Annual Capacity: Hydrazine hydrate 485 tonnes.

Letter of Intent No. & Date: LI: 478/87 dt. 27.8.87.

RAJENDRA V. SHAH, 5, Buildwell House, 3rd Floor, Linking Road, Santacruz (W), Bombay 400 054. (NA).

Products & Annual Capacity: *Finished products:* Acetic anhydride 500 tonnes; butyl acetate 1,200 tonnes; ethyl acetate 2,100 tonnes; pentaerithritol 2,400 tonnes; sodium formate 2,000 tonnes. *Intermediate Products:* Acetaldehyde 3,600 tonnes; acetic acid 3,000 tonnes, formaldehyde 3,000 tonnes and formic acid (converted from by product sodium formate) 600 tonnes.

Letter of Intent No. & Date: LI: 464/87 dt. 13.8.87.

GUJARAT ALKALIES & CHEMICALS LTD., Yashkamal Sayajiganj, Baroda 390 005. (SE).

Products & Annual Capacity: Caustic soda (as 100%) 1,36,425 tonnes, caustic soda flakes 26,400 tonnes, chlorine gas 1,20,740 tonnes and sodium hypochloride 2,500 tonnes.

Letter of Intent No. & Date: LI: 470/87dt. 17.8.87.

CIBATUL LTD., P.O. Atul-396 020, Dist. Valsad, Gujarat. (NA).

Product & Annual Capacity: Sulphanilic acid 300 tonnes.

Letter of Intent No. & Date: LI: 393/87 dt. 24.8.87.

THE ATUL PRODUCTS LTD., P.O. Atul 396 020, Dist. Valsad, Gujarat. (NA).

Product & Annual Capacity: Triclocarbon 100 tonnes.

Letter of Intent No. & Date: LI: 468/87 dt. 14.8.87.

GRASIM INDUSTRIES LTD., Chemicals Division, Birlagram, Nagda 456 331, M.P. (NA).

Products & Annual Capacity: High test bleaching powder/granules/tablets and high test calcium hypochloride 5,000 tonnes.

Letter of Intent No. & Date: LI: EOB/55/87 dt. 24.8.87.

BORDIA CHEMICALS PVT. LTD., 31, Bajajkhana, Ratlam 457 001, M.P. (NU).

Product & Annual Capacity: H. Acid 400 tonnes.

Letter of Intent No. & Date: LI: EOB/56/87 dt. 24.8.87.

UMESH SARAF, C/o. Asian Hotels Ltd., Bhikaji Cama Place, Ring Road, New Delhi 110 066. (NU).

Products & Annual Capacity: Biaxially oriented polypropylene film 2,000 tonnes.

Letter of Intent No. & Date: LI:SAC (NRI) 19/87 dt. 13.8.87.

ASHOK CHAUHAN, AKC House, E-27, Defence Colony, New Delhi 110 024. (NU).

Products & Annual Capacty: Biaxially oriented polypropylene film 2,000 tonnes.

Letter of Intent No. & Date: LI:SAC (NRI) 20/87 dt. 13.8.87.

KANORIA CHEMICALS & INDS. LTD., 16-A, Brabourne Road, Calcutta.

Products & Annual Capacity: Acetyl resins 2,000 tonnes and hexamine 1,500 tonnes

Letter of Intent No. & Date: LI 41 19.8.87.

SEPTEMBER 1987

KOTHARI SUGARS & CHEMI LTD., Kothari Buildings, 115, N bakkam High Road, Madras 60 (NA).

Product & Annual Capacity: Polyb 5,000 tonnes.

Letter of Intent No. & Date: LI: 52 15.9.87.

IBP CO. LTD., Gillanders House, 8 Subhas Road, Calcutta 700 001.

Products & Annual Capacity: Auto lubricating oil 31,500 tonnes an strial lubricating oil 3,500 tonnes

Letter of Intent No. & Date: LI. 53 18.9.87.

CIBATUL LTD., P.O. Atul, Dist. Gujarat-396 020. (NA).

Product & Annual Capacity: Castor atives 3,000 tonnes.

Letter of Intent No. & Date: 495 7.9.87.

PUNJAB STATE INDS. DEVT. C LTD., SCO 54-56, Sector 17-A, digar 160 017. (NU).

Product & Annual Capacity: propylene staple fibre 10,000 ton

Letter of Intent No. & Date: LI: dt. 14.9.87.

MALA POLYFOAM LTD., Mala Flour Mills Compound, Delhi Roa tapur, Meerut 250 003. (NU).

Products & Annual Capacity: (1) ificial leather cloth and foam 15,00,000 sq. mtrs. and (2) PVC cial leather cloth and foam cloth 15, sq. mtrs.

Letter of Intent No. & Date: LI: 515 14.9.87.

MAHADEO FERTILIZERS LTI Madanmohan Malaviya Marg, Lu 226 001, U.P. (NA).

Product & Annual Capacity: 10,000 tonnes.

Letter of Intent No. & date: LI: 53 23.9.87.

CIBATUL LTD., P.O. Atul 396 Valsad, Gujarat. (NA).

Product & Annual Capacity: B and intermediate chemicals 20

Letter of Intent No. & Date: LI 53 21.9.87.

INDIA VISCOSE LTD., Rose 3A, Avanashi Road, P.B. No. 3780, batore 641 018, Tamil Nadu. (NU).
& Annual Capacity: Oil field/in- al lignins and ligno sulphonates ene) 12,000 tonnes.
of Intent No. & Date: LI: PAB: 7 dt. 8.9.87.

N RARE EARTHS LTD., Sherba- 6th Floor, 111, Maharshi Karve d, Bombay. (NU).
cts & Annual Capacity: Ilmenite ,440 tonnes; monazite 1,200 tonnes; n 11,220 tonnes; rutile 9,900 tones; anite 7,080 tonnes and leucoxene 0 tonnes.
r of Intent No. & Date: LI: EOB: 87 dt. 15.9.87.

INDUSTRIES LTD., Post: Atul, t. Valsad, Gujarat 396 020. (NA).
ucts & Annual Capacity: 4,7-Di- oroquinoline 50 tonnes; 4-hydroxy-7- oroquinoline 50 tonnes and 4-hydroxy chloroquinoline-3-carboxylic acid 65 nnes.
er of Intent No. & Date: LI: 494/87 dt. 87.

RO ALLOYS CORP. LTD., 42, Dak- neshwar, 10, Hailey Road, New Delhi 001. (NU).
duct & Annual Capacity: Cephalexin 35 tonnes.
er of Intent No. & Date: LI: 498/87 dt. 9.87.

DOZ (I) LTD., Sandoz House, Dr. .B. Road, Worli, Bombay 400 018. A).
duct & Annual Capacity: Thioridazine 00 kgs.
ter of Intent No. & Date: LI: 560/87 dt. 8.9 87.

E GEE LABORATORIES PVT. TD., (Proposed), Capsule Technology Ltd., 164, Atlanta Building, 209, Nar- an Point, Bombay 400 021. (NU).
uct & Annual Capacity: Hard gela- e capsules 60,00,000 nos.
er of Intent No. & Date: LI: 543/87 dt. 9.87.

TOBER 1987

LA JUTE & INDS. LTD., Birla Bldg., 1, Mukherjee Road, Calcutta 700 001. NU).
duct & Annual Capacity: Hydrogen peroxide 4,500 tonnes.
er of Intent No. & Date: LI: PAB 987 dt. 21.10.87.

DCM LTD., Shriram Nagar, Kota 324 001. (NU).
Products & Annual Capacity: Polyester filament yarn 15,000 tonnes.
Letter of Intent No. & Date: LI: 587/87 dt. 9.10.87.

HARSHVARDHAN CHEMICALS & MINERALS LTD., 5/4, Film Colony, R.N.T. Mag, Indore 452 001. (NA).
Products & Annual Capacity: Sulphuric acid 55,000 tonnes, 20/30% oleum 5,000 tonnes, 60/70% oleum 5,000 tonnes, stabilised SO_3 5,000 tonnes and chlorosulphonic acid 5,000 tonnes.
Letter of Intent No. & Date: LI: 589/87 dt. 9.10.87.

MAX INDIA LTD., 12th Floor, Devika Tower, 6, Nehru Place, New Delhi 110 019. (NU).
Products & Annual Capacity: Adhesives, sealants and coatings (excluding items reserved for small scale sector) 5,000 tonnes.
Letter of Intent No. & Date: LI: 580/87 dt. 8.10.87.

VINDHYA PETROCHEMICALS LTD., Lentin Chambers, Dalal Street, Fort, Bombay 400 023. (NU).
Products & Annual Capacity: Glycol ethers 5,000 tonnes.
Letter of Intent No. & Date: LI: 512/87 dt. 30.10.87.

TEJPUR VANIJYA LTD., Lata Griha, Maniram, Dewan Path, Chandmari, Guwahati, Assam. (NU).
Products & Annual Capacity: Lime (of quality other than for construction and lime wash) 66,000 tonnes.
Letter of Intent No. & Date: LI: 595/87 dt. 16.10.87.

GANGA PHOSPHOROUS & CHEMICALS LTD., R.C. Centre, 67/3, Kanakapura Road, Bangalore 560 078. (NA).
Products & Annual Capacity: TV phosphors for black and white TVs 30 tonnes and TV phosphors for colour TVs 70 tonnes.
Letter of Intent No. & Date: LI: 600/87 dt. 21.10.87.

THE TATA OIL MILLS CO. LTD., Bombay House, 24, Homi Mody Street, Fort, Bombay. (NU).
Products & Annual Capacity: Synthetic

Available Directly From Manufacturers

EDTA / NTA & its Salts
DTPA -- Na_5
FERRIC SODIUM EDTA (Pharma/Photo Grades)
FERROUS FUMARATE I.P.

Agrochemicals

CHELATED ZINC - Min. 12% As Zn
CHELATED IRON - Min. 12% As Fe

Note:
Our products can replace Metaclaw/Chelashok/Acinol/Superquest/Sequesterene/Trilon/Versene Brand Sequestering Agents.

AVA CHEMICALS PVT. LTD.
3/5B, Jerome Estate, Opp. Inkokem Ltd.,
Jeri-Mari, Kurla Andheri Road, Bombay 400 072
Phones: 5123272/5136822/5126821
Gram: NEW GENER
Telex: 011-72398 SOC IN

detergents 30,000 tonnes.
Letter of Intent No. & Date: LI: 500/87 dt. 9.10.87.

HERDILLIA CHEMICALS LTD., Air India Building, Nariman Point, Bombay. (NU).
Products & Annual Capacity: Hydroxy benzaldehyde, anisic alcohols, anisaldehydes and other derivatives 500 tonnes.
Letter of Intent No. & Date: LI: 562/87 dt. 9.10.87.

CIBATUL LTD., P.O. Atul, Valsad, Gujarat. (NA).
Products & Annual Capacity: Epichlorohydrine 6,000 tonnes, allyl chloride 6,850 tonnes and hydrochloric acid 31% 10,925 tonnes.
Letter of Intent No. & Date: LI: 564/87 dt. 9.10.87.

HERDILLIA CHEMICALS LTD., Air India Building, Nariman Point, Bombay. (NU).
Products & Annual Capacity: Heat transfer media 3,000 tonnes and diphenyl 1,000 tonnes.
Letter of Intent No. & Date: LI: 570/87 dt. 9.10.87.

SHAW WALLACE & CO. LTD., 4, Bankshall Street, Calcutta. (NA).
Product & Annual Capacity: 2-Isopropyl/butyl bromide 90 tonnes.
Letter of Intent No. & Date: LI: 571/87 dt. 9.10.87.

J.K. SYNTHETICS LTD., Kamla Tower, Kanpur. (NA).
Products & Annual Capacity: Water proof cement paints 12,000 tonnes.
Letter of Intent No. & Date: LI: 572/87 dt. 9.10.87.

T.K. MOHAN, Protein & Chem. India Ltd., (Proposed), Keerthi Complex, 44, Kamarh Street, Salem, Tamil Nadu. (NU).
Products & Annual Capacity: Amino acid powder 1,400 tonnes, amino acid (L-cystine 84 tonnes and amino acid (L-thyrosine 24 tonnes.
Letter of Intent No. & Date: LI: EOB-70/87 dt. 7.10.87.

AMBALAL SARABHAI ENTERPRISES LTD., Wadi Wadi, Baroda 390 007. (NA).
Products & Annual Capacity: Highly purified insulin injections 5,06,000 vials.
Letter of Intent No. & Date: LI: 608/87 dt. 27.10.87.

NOVEMBER, 1987

CIBATUL LTD., P.O. Atul, Gujarat 396 020. (NA).
Products & Annual Capacity: Ketone formaldehyde resins and sulphonamide formaldehyde resins 250 tonnes.
Letter of Intent No. & Date: LI: 623/87 dt. 4.11.87.

BALAJI SOLVENTS PVT. LTD., 12, Co-operative Colony, Madras. (NU).
Products & Annual Capacity: Ether solvent 1,600 tonnes, ether anaesthetic 300 tonnes, ethyl acetate 1,500 tonnes and ethyl aceto acetate 600 tonnes.
Letter of Intent No. & Date: LI: 640/87 dt. 16.11.87.

HARSH VADERA, Exhibition Road, Patna 800 001. (NU).
Products & Annual Capacity: Polyurethane artificial leather 18,00,000 mtrs.
Letter of Intent No. & Date: LI: 648/87 dt. 18.11.87.

CIBATUL LTD., P.O. Atul-396 020, Dist. Valsad, Gujarat. (SE).
Product & Annual Capacity: Bisphenol-A 5,000 tonnes (after expn.).
Letter of Intent No. & Date: LI: 625/87 dt. 16.11.87.

THE TATA OIL MILLS CO. LTD., Bombay House, 24, Homi Mody Street, Fort, Bombay. (NU).
Products & Annual Capacity: Toilet soap 15,000 tonnes and glycerine (by-product) 1,650 tonnes.
Letter of Intent No. & Date: LI: 497/87 dt. 27.11.87.

DECEMBER 1987

NIRAJ PETROCHEMICALS LTD., 120, Srinagar Colony, Hyderabad. (NU).
Product & Annual Capacity: Maleic anhydride 5,000 tonnes.
Letter of Intent No. & Date: LI: PAB: 63/87 dt. 30.12.87.

HARDCASTLE & WAUD MFG. CO. LTD., Netivali Baug, Kalyan, Dist. Thane, Maharashtra. (NU).
Product & Annual Capacity: Standard powdered paint 1,000 tonnes.
Letter of Intent No. & Date: LI: PAB: 52/87 dt. 16.12.87.

ROCK HARD PETROCHEMICALS PVT. LTD., A-1, Industrial Area, Sanver Road, Indore 452 003. (NU).
Products & Annual Capacity: Formald hyde 10,000 tonnes and hexamine 7 tonnes.
Letter of Intent No. & Date: LI: PA 56/1987 dt. 28.12.87.

D.M. NTERWALA, Liberty Building, S Vithaldas Thackersey Marg, Bombay 4 020. (NU).
Product & Annual Capacity: Antimo trioxide 1,000 tonnes.
Letter of Intent No. & Date: LI: PA 51/87 dt. 4.12.87.

KAMALJIT SINGH, Mamal Mahal, 1 Carmichael Road, Bombay 400 02 (NU).
Products & Annual Capacity: (1) Fills f heat and mass transfer applications 70,00 cu. mtrs; (2) Drift eliminators for coolin towers 25,00,000 mtrs and (3) Mist el minators for industrial applications 10,00 nos.
Letter of Intent No. & Date: LI: PAB 68/87 dt. 31.12.87.

BAGALKOT UDYOG LTD., Air Indi Building, 14th Floor, Nariman Point Bombay 400 021. (NU).
Product & Annual Capacity: Electrolyti manganese dioxide 5,000 tonnes.
Letter of Intent No. & Date: LI: PAB 67/87 dt. 31.12.87.

MODI ALKALIES & CHEMICALS LTD., 18, Community Centre, New Friends Colony, New Delhi 110 065 (NA).
Products & Annual Capacity: Sodium hypochlorite (within the overall capacity of 12,600 tonnes per annum of stable bleaching powder and calcium hypochloride) 1,650 tonnes.
Letter of Intent No. & Date: LI: 672/87 dt. 22.12.87.

BANNARI AMMAN SUGARS LTD., 252, Mettupalayam Road, Coimbatore 641 043, Tamil Nadu. (NA).
Product & Annual Capacity: Citric acid 5,400 tonnes.
Letter of Intent No. & Date: LI: 770/87 dt. 31.12.87.

MANSURPUR CHEMICALS PVT. LTD., P.B. No. 14, Roorkee Road, Muzaffarnagar, Uttar Pradesh. (NU).
Products & Annual Capacity: Precipitated calcium carbonate 3,000 tonnes and activated calcium carbonate 500 tonnes.
Letter of Intent No. & Date: LI: 695/87 dt. 23.12.87.

AS COMPUTER SERVICES LTD., C-3, Community Centre, Safdarjung Development Area, New Delhi 110 016. (NA).

roduct & Annual Capacity: Insoluble sulphur 6,000 tonnes.

etter of Intent No. & Date: LI: 696/87 dt. 23.12.87.

EGHALAYA INDUSTRIAL DEVT. CORP. LTD., Kismat, Upland Road, Shillong 793 003. (NU).

roducts & Annual Capacity: Lime (of quality other than for construction and lime wash) 66,000 tonnes.

etter of Intent No. & Date: LI: 701/87dt. 30.12.87.

TAMIL NADU CHEMICAL PRODUCTS LTD., 10, Karpagambal Nagar, Mylapore, Madras 600 004. (NA).

roducts & Annual Capacity: Sodium formate 5,000 tonnes and dimethyl formamide 1,000 tonnes.

Letter of Intent No. & Date: LI: 680/87 dt. 18.12.87.

NDIAN ORGANIC CHEMICALS LTD., New Excelsior Building, 6th Floor, Wallace Street, Fort, Bombay 400 001. (NA)

Product & Annual Capacity: 5-Sulpho isophthalic acid dimethyl sodium salt 300 tonnes.

Letter of Intent No. & Date: LI: 697/87 dt. 23.12.87.

ORGANIC CHEMOILS LTD., 1365, Sector 15-B, Chandigarh 160 015. (SE).

Products & Annual Capacity: Fatty acids 18,000 tonnes (after expn.) and glycerine 900 tonnes (after expn.).

Letter of Intent No. & Date: LI: 694/87 dt. 23.12.87.

NIRMA PVT. LTD., Popular House, 7th Floor, Ashram Road, Navrangpura, Ahmedabad 380 009. (NU).

Products & Annual Capacity: Distilled fatty acids 30,000 tonnes and glycerine 2,000 tonnes.

Letter of Intent No. & Date: LI: 703/87 dt. 23.12.87.

OSWAL FATS & OILS LTD., 36, Regal Building, Connaught Place, New Delhi. (SE).

Products & Annual Capacity: Fatty acid/stearic acid 30,000 tonnes (after expn.) and glycerine 3,000 tonnes (after expn.).

Letter of Intent No. & Date: LI: 731/87 dt. 23.12.87.

TAMIL NADU INDUSTRIAL EXPLOSIVES LTD., 98-A, Vellore Road, Katpadi, Vellore 632 007, Tamil Nadu. (SE).

Products & Annual Capacity: Detonators 4,50,00,000 nos. (after expn.) and detonating fuse 1,20,00,000 mtrs. (after expn.).

Letter of Intent No. & Date: LI: 722/87 dt. 29/12/87.

GANDHI PAREKH INVESTMENT CORPN. LTD., Maker Bhavan No.2, 6th Floor, 18, New Marine Lines, Bombay 400 020. (SE).

Product & Annual Capacity: Organo tin stabilisers (PVC stabilizers) 500 tonnes (after expn.).

Letter of Intent No. & Date: 664/87 dt. 2.12.87.

TREHAN SONS INVESTMENTS PVT. LTD., 908, Ansal Bhavan, 16, K.G. Marg, New Delhi 110 001. (NU).

Product & Annual Capacity: Isobutyl benzene 500 tonnes.

Letter of Intent No. & Date: 749/87 dt. 31.12.87.

PRESTIGE LIME PVT. LTD., 9th Km, Janpath Road, Muzaffar Nagar, Uttar Pradesh. (SE).

Products & Annual Capacity: Precipitated calcium carbonate 9,000 tonnes.

Letter of Intent No. & Date: LI: 751/87 dt. 31.12.87.

CELLULOSE PRODUCTS OF INDIA LTD., Office Nos. 4 & 5, National Chambers, Nr. Dipali Theatre, Ashram Road, Ahmedabad 380 009. (NA).

Product & Annual Capacity: Urethane varnishes and paints 1,000 tonnes.

Letter of Intent No. & Date: LI: 771/87 dt. 31.12.87.

SILVER CHEMICALS, (Prop. Hindustan Agrochemicals Ltd.), Near Udai Sagar Crossing, Village Bichhadi, Udaipur, Rajasthan 313 024. (NA).

Products & Annual Capacity: H. acid (1-hydroxy-amino-naphthalene 3,6-disulphonic acid) 500 tonnes.

Letter of Intent No. & Date: LI: 684/87 dt. 18.12.87.

SURYA PROTEINS LTD., 3, Scindia House, Janpath, New Delhi 110 001. (NU).

Products & Annual Capacity: Fattyacids 16,000 tonnes, stearic acids 3,000 tonnes and glycerine 1,600 tonnes.

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WE MANUFACTURE AND EXPORT
6-METHYL COUMARIN
p-METHOXY ACETOPHENONE
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GALLACETOPHENONE AND ITS METHYL ETHERS
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2',5'-DIHYDROXY ACETOPHENONE AND ITS METHYL ETHERS
PYROGALLOL TRIMETHYL ETHER
ORTHO AND PARA ANISIC ACIDS
2-HYDROXY-1-NAPHTHALDEHYDE
1'-HYDROXY-2'-ACETONAPHTHONE
2'-HYDROXY-1'-ACETONAPHTHONE
BIO ORGANICS
Off: 61, N.S.C. Bose Road, Madras 600 079.
Phone: 35357/32024.
Lab: B-7, SIDCO Industrial Estate, Arumbakkam, Madras 600 106.
Phone: 426854.

Letter of Intent No. & Date: LI: 752/87 dt. 31.12.87.

LAKSHMI FINANCE & INDUSTRIAL CORPN. LTD., 1st Floor, Sarvodaya, 1-10-60/3, Begumpet, Hyderabad 500 016. (NU).
Product & Annual Capacity: Stretch blow moulded PET/PVC bottles/containers 500 tonnes.
Letter of Intent No. & Date: LI: 685/87 dt. 18.12.87.

SIVAPRASAD REDDY, (Niraj Petrochemicals Ltd.) (Proposed), 124, Srinagar Colony, Hyderabad 500 873. (NU).
Products & Annual Capacity: Precipitated calcium carbonate 9,000 tonnes and activated calcium carbonate 1,500 tonnes.
Letter of Intent No. & Date: LI: 689/87 dt. 18.12.87.

O. PRABHAKAR REDDY, 8-2-540/5/A, Road No. 4, Banjara Hills, Hyderabad 500 034. (NU).
Products & Annual Capacity: Camphor/isoborneol 1,000 tonnes, sodium acetate trihydrate (by-product) 900 tonnes, pinetar (by-product) 30 tonnes and dipentine (by-product) 10 tonnes.
Letter of Intent No. & Date: LI: 769/87 dt. 31.12.87.

ALLIED RESINS & CHEMICALS LTD., 13, Camac Street, Calcutta 700 017. (NU).
Product & Annual Capacity: Paraformaldehyde 5,000 tonnes.
Letter of Intent No. & Date: LI: 737/87 dt. 31.12.87.

LUBRIZOL INDIA LTD., Leo House, 4th Floor, 88-C, Old Prabhadevi Road, Bombay 400 025. (NA).
Product & Annual Capacity: Sodium hydrosulphide solution (30%) 1,400 tonnes.
Letter of Intent No. & Date: LI: 742/87 dt. 31.12.87.

THE DHARAMSI MORARJI CHEMICALS CO. LTD., Prospect Chambers, 317/21, Dr. D.N. Road, Fort, Bombay 400 001. (SE).
Product & Annual Capacity: Chlorosulphonic acid 16,500 tonnes (after expn.).
Letter of Intent No. & Date: LI: 774/87 dt. 31.12.87.

J.V. RAMANAMURTHY, D. No. 2-22-3/1, Sarada Street, Kakinada-3, A.P. (NU).
Product & Annual Capacity: Precipitated calcium carbonate 6,000 tonnes.
Letter of Intent No. & Date: LI: 730/87 dt. 29.12.87.

STRAW PRODUCTS LTD., Nehru House, 4, Bahadur Shah Zafar Marg, New Delhi 110 002. (NU).
Products & Annual Capacity: Thiourea 1,000 tonnes and dicyandiamide 4,000 tonnes.
Letter of Intent No.: LI: 389/87.

J.K. MALHOTRA, (M/s. Mura Chemicals India Ltd.), 15, J.N. Heredia Marg, Ballard Estate, Bombay. (NU).
Products & Annual Capacity: Super and electro conductive blacks of various grades and qualities 9,000 tonnes.
Letter of Intent No. & Date: LI: EOB: 80/87 dt. 31.12.87.

AMORD ASSOCIATES (NRI), (M/s. Manorama Phynex Chemicals Pvt. Ltd.) (Proposed), Manorama Press Building, Behind Old Power House, Satna, M.P. (NU).
Products & Annual Capacity: Colouring agents and additives 30,000 tonnes.
Letter of Intent No. & Date: LI: EOB: 84/87 dt. 31.12.87.

HERDILLIA CHEMICALS LTD., Air India Building, Nariman Point, Bombay 400 021. (NA).
Products & Annual Capacity: Propylene oxide and high epoxides (C_4 to C_{18}) 1,500 tonnes and alpha methyl styrene 2,700 tonnes.
Letter of Intent No. & Date: LI: 670/87 dt. 31.12.87.

MODI ALKALIES & CHEMICALS LTD., 18, Community Centre, New Friends Colony, New Delhi 110 065. (NA).
Product & Annual Capacity: Aluminium chloride 5,000 tonnes.
Letter of Intent No. & Date: LI: 675/87 dt. 14.12.87.

MODI ALKALIES & CHEMICALS LTD., 18, Community Centre, New Friends Colony, New Delhi 110 065. (NA).
Product & Annual Capacity: Bleaching earth 6,500 tonnes.
Letter of Intent No. & Date: LI: 674/87 dt. 14.12.87.

THE NEW INDIA INDUSTRIES LTD., 124/A, Bakhtawar, Nariman Point, Bombay 400 021. (NU).
Products & Annual Capacity: (1) Chemicals for colour paper 16,02,000 litre (Starter-2000 litres, developer 8,00,00 litres and fixer 8,00,000 litres). (2) Chemicals for colour film 2,01,220 litres (Starte 1,200 litres, developers 6,00,000 litres an fixer 14,00,000 litres), (3) Chemicals fo X-ray film 2,51,000 litres (starter 1,00 litres, developers 6,00,000 litres and fixe 15,00,000 litres), (4) Chemicals fo graphic art film 4,00,000 litres (develope 3,00,000 litres and fixer 1,00,000 litres)
Letter of Intent No. & Date: LI: 658/87 dt 11.12.87.

JAYSYNTH DYESTUFF (I) LTD., E-16 Everest, Tardeo Road, Bombay 400 034 (NU).
Products & Annual Capacity: Disperse dyes 2,00,000 kgs., reactive dyes (anthraquinone base) 1,20,000 kgs, vat dyes 1,00,000 kgs. and dye intermediates 62,000 kgs.
Letter of Intent No. & Date: LI: 665/87 dt. 2.12.87.

HIND BIOGEN PVT. LTD., 9/4, Sarvapriya Vihar, New Delhi 110 016. (NU).
Products & Annual Capacity: Metronidazole 30,000 kgs., mebendazole 5,000 kgs., caphalexin 15,000 kgs. pindolol 500 kgs., nifedipine 1,000 kgs., trimethoprim 5,000 kgs., sulphamethoxazole 20,000 kgs., ethambutol 10,000 kgs., niflumic acid 5,000 kgs., loperamide 500 kgs., thioridazine HCl 1,000 kgs., and related formulations worth Rs. 10,00,00,000.
Letter of Intent No. & Date: LI: 776/87 dt. 31/12/87.

GLINDIA LTD., Dr. Annie Besant Road, Bombay 400 025. (NA).
Products & Annual Capacity: Tablets/capsules/syrup/dry granules from the basic drugs cephalexin 7,500 kgs.
Letter of Intent No. & Date: LI: 733/87 dt. 31.12.87.

N.R. KRISHNAMOORTHY, M.D., Kerala State Drugs & Pharmaceuticals Ltd., Kalavoor 688 522, Alleppey, Kerala. (SE/NA).
Products & Annual Capacity: Allupurinol tablets IP 53 kgs., griseofulvin tablets IP 263 kgs., reserpine tablets IP 290 grams, sulphasomidine tablets BP 352 kgs., trifluopromazine tablets USP 21 kgs., cloxacillin capsules BP 297 kgs., methyl ergometrine maleate injection IP 75 grams, vitamin B1 654 kgs. (after expn.)

vitamin B6 212 kgs., (after expn.), vitamin B12 injections 430 kgs. (after expn.), cetrimide 788 kgs and chlorhexidine gluconate solution 1,575 kgs.

etter of Intent No. & Date: LI: 777/87 dt. 31.12.87.

EL LTD., 34, Chowringhee Road, Calcutta. (NA).

roducts & Annual Capacity: (1) D-alpha phenyl glycine and its salt/derivatives stage of manufacture -- starting from benzaldehyde 100 tonnes, (2) D-4-hydroxy phenyl glycine and its salts/derivatives stage of manufacture starting from phenol 30 tonnes.

Letter of Intent No. & Date: LI: 656/87 dt. 21.12.87.

IEL LTD., 34, Chowringhee Road, Calcutta. (NA).

Products & Annual Capacity: Menazon technical and its formulations 300 tonnes.

Letter of Intent No. & Date: LI: 657/87 dt. 31.12.87.

INDIAN IMMUNOLOGICALS, (A unit of Indian Dairy Corporation), 11-4-657, Lakdi-ka-pul, Hyderabad 500 004. (SE/NA).

Products & Annual Capacity: (1) Oxytetracycline hydrochloride injection BP vet 50 mg/ml 50,000 litres (after expn.), oxytetracycline hydrochloride injection BP vet. 100 mg/ml 3,000 litres, (3) sulphadimidine sodium injection BP vet 24,000 litres (after expn). and (4) oxytetracycline hydrochloride injection BP vet 200 mg/ml. (NA) 3,000 litres.

Letter of Intent No. & Date: LI: 778/87 dt. 31/12/87.

RANBAXY LABORATORIES LTD., Nehru Place, New Delhi 110 019. (SE).

Products & Annual Capacity: Bulk drugs -- perfloxacin 2 tonnes, diltiazem 5 tonnes, buspiron 2 tonnes, ciproflexacin 2,500 kgs., diazepam 3,000 kgs. and formulations based on 70% of the above bulk drugs.

Letter of Intent No. & Date: LI: 721/87 dt. 29.12.87.

T.S. JAISHANKAR, 7/2, K.R.Road, IV Street, Poes Garden, Madras 600 086. (NU).

Products & Annual Capacity: 6-Amino penicillanic acid 100 tonnes, ampicillin 70 tonnes, amoxycillin 40 tonnes, 7-amino acetoxy cephalosporinic acid 75 tonnes, cephalexin 25 tonnes and cephradine 5 tonnes.

Letter of Intent No. & Date: LI: 717/87 dt. 29.12.87.

RANBAXY LABORATORIES LTD., 19, Nehru Place, New Delhi 110 019. (SE).

Products & Annual Capacity: Ranitidine bulk drug 20,000 kgs., (after expn.) and ranitidine formulations 14,000 kgs. (after expn).

Letter of Intent No. & Date: LI: 744/87 dt. 31.12.87.

DUNLOP INDIA LTD., 57-B, Mirza Ghalib Street, Calcutta 700 016. (NU).

Product & Annual Capacity: Rifampicin 100 tonnes.

Letter of Intent No. & Date: LI: 678/87 dt. 15.12.87.

THE TATA OIL MILLS & CO. LTD., Bombay House, 24, Homi Mody Street, Fort, Bombay 400 001. (NU).

Products & Annual Capacity: Toilet soaps 15,000 tonnes and glycerine (by-product 1,650 tonnes).

Letter of Intent No. & Date: LI: 496/87 dt. 18.12.87.

JANUARY 1988

THE PRADESHIYA INDUSTRIAL & INVESTMENT CORPORATION OF U.P. LTD., 2nd Floor, Jawahar Bhavan Annexe, Ashok Marg, Lucknow 226 001. (NU).

Products & Annual Capacity: White phosphorus 2,500 tonnes, red phosphorous 1,000 tonnes, phosphorus pentasulphide 2,000 tonnes and phosphorus trichloride 1,500 tonnes.

Letter of Intent No. & Date: LI: 5/88 dt. 27.1.88.

LUBRIZOL INDIA LTD., Leo House, 4th Floor, 88-C, Old Prabhadevi Road, Bombay 400 025. (SE).

Product & Annual Capacity: Chemical additives 25,000 tonnes.

Letter of Intent No. & Date: LI: 6/88 dt. 27.1.88.

BOMBAY GAS CO. PVT. LTD., 214, Dr. D.N. Road, Fort, Bombay. (NU).

Product & Annual Capacity: Amino acids 600 tonnes.

Letter of Intent No. & Date: LI: EOB: 1/88 dt. 18.1.88.

IEL LTD., 34, Chowringhee Road, Calcutta 700 071. (NA).

Product & Annual Capacity: Atenolol and its formulations based thereon 10 tonnes.

Letter of Intent No. & Date: LI: 8/88 dt. 28.1.88.

GLINDIA LTD., Dr. Annie Besant Road, Bombay 400 025. (NA).

Products & Annual Capacity: Basic drug salbutamol and formulations based thereon 1,000 kgs.

Letter of Intent No. & Date: LI: 12/88 dt. 29.1.88.

FEBRUARY 1988

DEBENDRA K. MODI, Modi Pharmaceuticals, Banka Bazar, Calcutta 753 002. (NU).

Products & Annual Capacity: Perchloro ethylene, trichloro ethylene and carbon tetrachloride 10,000 tonnes.

Letter of Intent No. & Date: LI: 3/1988 NRI dt. 12.2.88.

DILIP BORGOHAIN, Linkage Pvt. Ltd., Amolapatti Chariali, A.T. Road, Dibrugarh -786 001, Assam. (NU).

Products & Annual Capacity: Sulphuric acid 15,000 tonnes and liquid sulphur dioxide 1,500 tonnes.

Letter of Intent No. & Date: LI: 51/88 dt. 29.2.88.

DCM LTD., (Unit: Daurala Sugar Works), Kanchenjanga Building, 18, Barakhamba Road, New Delhi 110 001. (SE).

Products & Annual Capacity: Benzaldehyde 450 tonnes (after expn.) and sodium benzoate (by-product) 450 tonnes.

Letter of Intent No. & Date: LI: 44/88 dt. 18.2.88.

BIOCHEMZYME INDIA PVT. LTD., 20Km., Hosur Road, Hebbagodi 562 158, Bangalore Dist., Karnataka. (NU).

Products & Annual Capacity: Fungal enzymes 100 tonnes, natural colours 20 tonnes and natural gums 100 tonnes.

Letter of Intent No. & Date: LI: 7/88 EOB dt. 29.2.88.

CENTURY ENKA LTD., Bhosari, Pune 411 026. (NA).

Products & Annual Capacity: *(1) Polymerisation initiators such as* (a) Bis (2-ethyl hexyl) peroxydicarbonate, (b) diisopropyl peroxy dicarbonate, (c) T-butyl peroxypivalate, (d) T-butyl peroxy-2-ethyl hexanoate, (e) T-butyl peroxy-3,5,5-trimethyl hexanoate, (f) T-butyl peroxybenzoate, (g) di-t-butyl peroxide, (h) dicumyl peroxide, (i) 3-isopropyl hydroperoxide, (j) cumene hydroperoxide, (k) methyl ethyl ketone peroxide, (l) 2,5-dimethyl-2,5-bis (t-butyl

peroxy) hexane, (m) di-benzoyl peroxide and (n) dilauroyl peroxide 400 tonnes and (2) *allyl esters 300 tonnes.*
Letter of Intent No. & Date: LI: 45/88 dt. 18.2.88.

MODI ALKALIES & CHEMICALS LTD., 18, Community Centre, New Friends Colony, New Delhi 110 065. (NA).
Products & Annual Capacity: Tri/penta chlorophenol 2,800 tonnes.
Letter of Intent No. & Date: LI: 61/88 dt. 26.2.88.

EASTERN SPINNING MILLS & INDUSTRIES LTD., Prigachha, P.O. Kadamgachhi, Dist. North 24-Parganas, West Bengal. (NU).
Product & Annual Capcity: Poly aluminium chloride 15,000 tonnes.
Letter of Intent No. & Date: LI: 58/88 dt. 26.2.88.

TAMIL NADU INDL. DEVT. CORPN. LTD., 735, Anna Salai, LLA Building, 3rd Floor, Madras 600 002. (NU).
Products & Annual Capacity: Pyridine 300 tonnes and alkyl pyridine (alpha, beta and gamma picolines and 2-vinyl pyridine) 580 tonnes.
Letter of Intent No. & Date: LI: 23/88 dt. 8.2.88.

BOROSIL GLASS WORKS LTD., Khanna Construction House, 44, Dr. R.G. Thadani Marg, Worli, Bombay 400 018. (NU).
Product & Annual Capacity: Reprographic toners and developers 750 tonnes.
Letter of Intent No. & Date: 24/88 dt. 8.2.88.

IEL LTD., 34, Chowringhee, Calcutta 700 071. (NU).
Products & Annual Capcity: (1) Oil field chemicals 4,000 tonnes, (2) Water treatment chemicals 5,000 tonnes and (3) industrial additives 2,000 tonnes. (All the three items will exclude pour point depressent).
Letter of Intent No. & Date: LI: 29/88 dt. 8.2.88.

RAMA WRISHI RASAYAN LTD., 812, Raheja Chambers, Nariman Point, Bombay 400 021. (NA).
Products & Annual Capacity: Various grades of oleums 8,325 tonnes and liquid sulphur trioxide 3,330 tonnes.
Letter of Intent No. & Date: LI: 16/88 dt. 4.2.88.

G.R. KHANDELWAL, B-21, Preet Vihar, New Delhi 110 092. (NU).
Product & Annual Capacity: Expandable polystyrene 10,000 tonnes.
Letter of Intent No. & Date: LI: 35/88 dt. 11.2.88.

RAMESH S. PILANI, Ganesh Anhydride Ltd., 145-A, Dr. Viegas Street, Kalbadevi Road, Bombay 400 002. (NU).
Product & Annual Capacity: Maleic anhydride 7,000 tonnes and LI: 56/88 dt. 29.2.88.

BASF INDIA LTD., May Baker House, S.K. Ahire Marg, Bombay 400 025. (NA).
Products & Annual Capacity: Ammonia synthesis catalyst (oxidised and prereduced type) 710 tonnes.
Letter of Intent No. & Date: 48/88 dt. 22.2.88.

CHEMFAB CHLORATES, Abhishekapakkam, Poornamkuppam, Pondicherry 605 007. (SE).
Product & Annual Capacity: Sodium chlorate 2,000 tonnes (after expn.).
Letter of Intent No. & Date: LI: 39/88 dt. 11.2.88.

SOUTHERN PETROCHEMICAL INDS. CORPN. LTD., 97, Mount Road, Guindy, Madras 600 032. (NA).
Product & Annual Capacity: Rifampicin 100 tonnes.
Letter of Intent No. & Date: LI: 31/88 dt. 8.2.88.

CEPHAM MEDICAL LEASING LTD., M-134, Connaught Circus, New Delhi 110 001. (NU).
Product & Annual Capacity: Ampicillin sodium 30 tonnes.
Letter of Intent No. & Date: LI: 6/88 (EOB) dt. 19.2.88.

MARCH 1988

MR. BIKRAMJIT S. GREWAL, (Parsin Chemicals Pvt. Ltd., Sterling Heights, Michigan 48310, USA. (NU).
Product & Annual Capacity: Sodium azide 250 tonnes.
Letter of Intent No. & Date: LI: EOB: 11/88 dt. 18.3.88.

S. ANNAMALAI, 4, Old Natham Road, Chokkikulam, Madurai 625 002, Tamil Nadu. (NU).
Products & Annual Capacity: Chlorates and perchlorates such as potassium chlorate, potassium perchlorate, ammonium perchlorate, magnesium perchlor sodium perchlorate and sodium chlo 5,000 tonnes.
Letter of Intent No. & Date: LI: 114/8 25.3.88.

BALMER LAWRIE & CO. LTD., Spur Tank Road, Chetput, Madras 031. (NA).
Products & Annual Capacity: Antic dants and functional additives like hi ered phenols etc. 1,000 tonnes.
Letter of Intent No. & Date: LI: 111/88 25.3.88.

IDEAL ORGANICS INDIA LTD., (P posed), A-969, Indira Nagar, Luckn 226 016, U.P. (NU).
Products & Annual Capacity: N-butyl a tate 3,000 tonnes and n-butanol 3, tonnes.
Letter of Intent No. & Date: 119/88 29.3.88.

BALMER LAWRIE & CO. LTD., Netaji Subhash Road, Calcutta 700 0 (NA).
Products & Annual Capacity: Oil well transportation chemicals including em sifers, weighting agents, cement additiv filteration controls, viscosifiers, defoa ers, lubricants, detergents, polymers, s factants, friction reducers, tailorm formulations etc. 7,000 tonnes.
Letter of Intent No. & Date: LI: 127/88 30.3.88.

ALPHA DRUG INDIA LTD., SCO Sector 26, Chandigarh 160 026. (NU
Product & Annual Capacity: Trimet phosphate 1,000 tonnes.
Letter of Intent No. & Date: LI: 94/88 21.3.88

MR. M.N. VENKATASUBRAMANIA 25-D, State Bank of India Colo 22-Station Road, West Mambala Madras. (NU).
Products & Annual Capacity: Synthe rutile 1st year - 10,000 tonnes; 2nd ye -- 15,000 tonnes; 3rd year -- 30,0 tonnes; 4th year -- 30,000 tonnes and 5 year 30,000 tonnes.
Letter of Intent No. & Date: LI: 8/7/ MEPZ DT. 30.3.88.

INDIAN DRUGS & PHARM. LTD., I Complex, P.O. Dundahera, Gurga Haryana. (SE).
Products & Annual Capacity: Benzyl p icillin 'G' potassium salt 1,000 mmu
Letter of Intent No. & Date: LI: 130/

3.88.

USTRIAL PROMOTION AND IN-
ESTMENT CORP. OF ORISSA
TD., IPICOL House, Janpath, Bhuba-
hwar 751 007, Orissa. (NU).
duct & Annual Capacty: Gentamycin
lphate 5,000 kgs.
er of Intent No. & Date: LI: 95/88 dt.
1.3.88.

CTORS ORGANIC CHEMICALS
TD., 6-3-563/32, Somajiguda, Hydera-
ad. (NU).
ducts & Annual Capacity: Ampicillin
ihyrate 30 tonnes, amoxicillin trihydrate
tonnes, cloxacillin sodium 12 tonnes and
ephalexin monohydrate 32 tonnes.
tter of Intent No. & Date: LI: 65/88 dt.
3.88.

NJAB STATE INDL. DEVT. CORP.
LTD., SCO 54-56, Sector 17-A, Chan-
igarh 160 017. (NU).
ducts & Annual Capacity: Tetracycline
ydrochloride IP 100 tonnes, tetracycline
formulations IP 70 tonnes, oxytetracycline
IP 50 tonnes and oxytetracycline formu-
lations IP 35 tonnes.
tter of Intent No. & Date: LI: 72/88 dt.
11.3.88.

DIAN ORGANIC CHEMICALS
LTD., New Excelsior Building, 6th Floor,
Wallace Street, Fort, Bombay 400 001.
(NA).
oduct & Annual Capacity:
3,4,5-Trimethoxy benzaldehyde 250
tonnes.
tter of Intent No. & Date: LI: 84/88 dt.
14.3.88.

PRIL 1988

P CO. LTD., Chemical Divion), 8th
Floor, Hindustan Times House, K.G.
Marg, New Delhi 110 001. (NU).
roducts & Annual Capacity: Detonating
fuse 1,50,00,000 mtrs. and cast booster 30
tonnes.
etter of Intent No. & Date: LI: 187/88 dt.
8.4.88.

UPER BYTERON SYSTEMS LTD.,
D-4/7, Vasant Vihar, New Delhi 110 057.
(NU).
roducts & Annual Capacity: Polybuty-
lene pipes 1,070 tonnes and polyacetal fit-
tings 250 lines.
etter of Intent No. & Date: LI: 177 dt.
21.4.88.

HE WESTERN INDIA POLYWOOD
LTD., Baliapatam, Cannanore 670 010.
Kerala. (NA).

Products & Annual Capacity: Water based coal, water based printing inkand solventless U.V, curable top coat (for captive consumption) 85,500 kgs.
Letter of Intent No. & Date: LI: 84/88 dt. 28.4.88.

PAHLAJ B. BAJAJ, 63, Nariman Bhavan, 273, Nariman Point, Bombay 400 021. (NU).
Product & Annual Capacity: Spray plaster and textured coating 5,000 tonnes.
Letter of Intent No. & Date: LI: 185/88 dt. 28.4.88.

THE SANJIVANI (TAKLI) SAHAKARI SAKHAR KARKHANA LTD., Sahajanandanagar, Post: Shingnapur, Taluka Kopergaon, Dist. Ahmednagar, Maharashtra. (NA).
Product & Annual Capacity: N-butanol 4,500 tonnes.
Letter of Intent No. & Date: LI: 176/88 dt. 21.4.88.

KORON BUSINESS SYTEMS LTD., Plot No. 10, Off, Dr. E. Moses Road, Worli, Bombay 400 018. (NA).
Products & Annual Capacity: Toner 25 tonnes and developer 25 tonnes.
Letter of Intent No. & Date: LI: 151/88 dt. 13.4.88.

IDL CHEMICALS LTD., Chenoy Trade Centre, 4th Floor, 116, Park Lane, P.B. No. 2051, Secunderabad 500 003. (NA).
Products & Annual Capacity: Ethyl vannilin 50 tonnes and vanillin 150 tonnes.
Letter of Intent No. & Date: LI: 152/88 dt. 13.4.88.

THE TATA OIL MILLS CO. LTD., Bombay House, 24, Homi Mody Street, Fort, Bombay 400 001. (NU).
Products & Annual Capacity: Plant growth nutrients 2,400 tonnes and sterol concentrate (by-product) 88 tons.
Letter of Intent No. & Date: LI: 194/88 dt. 27.4.88.

RALLIS INDIA LTD., Agrochemicals Divn., 21, D.S. Marg, Fort, Bombay 400 001. (NU).
Product & Annual Capacity: Daminozide – a plant growth regulant 200 tonnes.
Letter of Intent No. & Date: LI: 154/88 dt. 13.4.88.

GRASIM INDUSTRIES LTD., Chemical Division, Birlagram, Nagda, M.P. 456 331. (NA).
Product & Annual Capacity: Chlorosulphonic acid 6,600 tonnes.
Letter of Intent No. & Date: LI: 135/88 dt. 5.4.88.

DEEPAK NITRITE LTD., Shivshakti Building, B.G. Kher Road, Worli, Bombay 400 018. (NU).
Products & Annual Capacity: Nitro aromatics 12,000 tonnes, nitrated esters 1,000 tonnes, aromatic amines 3,000 tonnes and metanilic acid 1,500 tonnes.
Letter of Intent No. & Date: LI: 178/88 dt. 21.4.88.

S.S. CHAHAL, 431, Mota Singh Nagar, Jalandhar, Punjab. (NU).
Products & Annual Capacity: (1) Medicated & nonmedicated adhesive tapes & wound pads 25,00,000 mtrs., (2) Pop bandages 20,00,000 mtrs., (3) Medical pads (including gauze, surgical absorbant and post operated pads) 2,00,00,000 nos and (4) snaps and snowbets (sterilised for MT surgical & gynaecological use) 10,00,000 nos.).
Letter of Intent No. & Date: LI: SAC/NRI 6/88 dt. 8.4.88.

VAM ORGANIC CHEMICALS LTD., Skyline House, 3rd Floor, 85, Nehru Place, New Delhi 110 019. (NU).
Products & Annual Capacity: Insulin 3,000 MMU.
Letter of Intent No. & Date: LI: 192/88 dt. 27.4.88.

M.I. PATEL, Sanjiv, 12th Road, New India Society, JVPD Scheme, Bombay 400 049. (NU).
Products & Annual Capacity: Contoured elasticated disposable baby diapers 15,00,00,000 nos.
Letter of Intent No. & Date: LI: 141/88 dt. 8.4.88.

AARTI DRUGS PVT. LTD., 1, Kalpana Colony, Ram Baug, Bhairamnath Road, Maninagar, Ahmedabad 380 008. (NA).
Products & Annual Capacity: Niacin 1,60,000 kgs. and Niacinamide 48,000 kgs.
Letter of Intent No. & Date: LI: 136/88 dt. 18.4.88.

ROUSSEL PHARM. (I) LTD., **D-Shivsagar, Dr. A.B. Road, Worli, Bombay. (NA).**
Products & Annual Capacity: Surgam tablets 300 mg. 12,00,000 tablets.
Letter of Intent No. & Date: LI: 149/88 dt. 13.4.88.

GLINDIA LTD., Dr. A.B. Road, Bombay. (NA).
Products & Annual Capacity: Basic drug labetalol and its formulation 15 tonnes.
Letter of Intent No. & Date: LI: 101/88 dt. 20.4.88.

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Calender of Events

AUGUST 1987

M.G.C.C. to go on stream by 1989-90

The Maharashtra Gas Cracker Complex being set up by Indian Petrochemicals Corporation Limited is expected to go on stream by 1989-90. The complex will be producing acetylene black (2500 MTPA), Diethylene Glycol (4245 MTPA), Ethylene Oxide (5000 MTPA), HDPE (55,000 MTPA), LLDPE (80,000 MTPA), Methylene Glycol (50,000 MTPA), Polypropylene (60,000 MTPA) and Triethylene Glycol (164 MTPA). The scope for ancillary industries in the small scale and tiny sector is rated as immence.

Ethylene based units to come up around M.G.C.C.

In the list of units establishing their plants in the M.G.C.C. complex figure Polyolefins India Limited which will manufacture HDPE/EVA; Herdillia for manufacturing EPM/EPDM at the rate of 5,700 TPA; Parekh Dye Chem for the manufacture of VAM with 3,700 TPA; and Polychem for manufacture of styrene with a capacity of 3,500 TPA. The four units will together account for 35,000 TPA of merchant ethylene which M.G.C.C. is expected to deliver.

Soda ash imports to be canalised

In order to bring about discipline in the arrival of soda ash imports the Government has decided to remove import of this chemical from the Open General Licence and canalise all imports through M.M.T.C.

H.B.J. facilities ready: users long

With the H.B.J. pipelines and other connected projects including O.N.G.C.'s gas facilities in Hazira coming up on time and uncertainty in the setting up of three fertiliser plants, the Government faces a situation of being saddled with an infructous investment of Rs. 3,000 crores. The gas based power projects are also expected to be delayed beyond 18 months forcing G.A.I.L. to look for alternate consumers of gas. I.P.C.L., G.S.F.C., I.E.L. and D.E.S.U. are looked upon as likely consumers.

Curtailment of C.C.S. to end

The Union Government has decided to discontinue the policy of making proportionate reduction in the rate of Cash Compensatory Support (CCS) in individual cases where an advance import licence or imprest licence has been issued for a value which is higher than the normal R.E.P. value.

Pollution control norms made stricter

The Union Government has issued detailed guidelines to State Governments regarding the areas to be avoided for setting up certain industries, precautions to be taken for site selection and other environmental protections to be incorporated from the implementation stage of the project.

Oil import bill soars

The oil import bill for 1987-88 is expected to be about Rs.4,000 crores, about Rs.1,500 crores higher than the previous year. The Government has contracted for imports of 21.5 million tonnes of crude oil at about $18 a barrel.

New Oil find in Krishna Offshore

O.N.G.C. has struck oil and gas in well GS-12 in the Krishna-Godavari offshore. The well drilled to a depth of 2,750 metres is yielding oil at the rate of 1,025 barrels a day and 12,074 cubic metres of gas a day.

Steps for ensuring supply of raw materials for Plastics Industry

Official teams from the Ministry of Chemicals and Petrochemicals have been sent abroad to scout for adequate quantities of raw materials. The Association of Plastic Processing Industries also urged the Government to reduce import duties on plastic raw materials in view of their firming up in the international market.

G.S.F.C. raises price on Caprolactum

The Gujarat State Fertilizers Company has increased the price of Caprolactum by 10% from Rs.30,400 to Rs.33,500 per tonne. The increase is in line with the firmness noted in the international prices which now reign at close to $1960 per tonne.

Perspective Plan for drug exports drawn up

A high level export promotion group under the Department of Chemicals & Petrochemicals has drawn up a perspective plan for boosting drug exports which are expected to reach Rs.1,430 crores by 2000 A.D. Formulations are expected to account for Rs.260 crores by 2000 A.D.

Acrylic Fibre shortage feared

With demand of acrylic fibre likely to reach one lakh tonnes per annum by 2000 A.D. and installed capacity likely to be only 46,000 tonnes per annum, a severe shortage of acrylic fibre is likely to arise. A number of projects are however, on the pipeline and speedy government clearance is called for.

B.K. Birla group to enter into fine chemicals production

The B.K. Birla group of companies is all set to enter the high technology area of fine chemicals in collaboration with Enka of Holland. The group has identified a couple of projects and is awaiting government clearance.

No Naphtha cracker for Madras

Mr. G.V. Ramakrishna, Union Secretary

for Petroleum and Natural Gas ruled out the feasibility of setting up a naphtha cracker based on feedstock from the Madras refineries. M.R.L. Chairman, Mr. Deenadayalu indicated that there would be no naphtha available considering the increased demand for middle distillates such as petrol.

Additional Styrene Capacity urged

An acute shortage of styrene used for manufacture of PS, ABS, SBR, etc., is being felt with demand placed at 43,000 tonnes and production not expected to cross 25,000 tonnes. The balance is to be met through imports. Styrene users feel that with annual installed capacity at only around 44,000 tonnes considerable scope for additional capacity exists.

S.T.C. stops LDPE imports

The State Trading Corporation has ceased import of LDPE even though the item is in short supply. The corporation is reluctant to place orders as the landed cost of imported material works out higher than the price quoted by I.P.C.L. S.T.C. planned to import around 15,000 tonnes of material but is now waiting for a government decision to lower the import duty.

Change in import policy of Penicillin G likely

The Department of Chemicals & Petrochemicals is reported to have decided to change the imported and indigenous pencillin G consumption ratio from 70:30 to 60:40. The move is designed to help the public sector units like H.A.L. and I.P.C.L. who are nursing idle stocks. The landed cost of imported Penicillin G works out to Rs. 275 per BOU as against an indigenous price of Rs. 675 per BOU. Small scale units are however, exempt from this change. Small scale units can procure any amount of pencillin G from domestic sources. This amount will be treated as 40% of their annual requirement and import clearance will be given for the remaining 60%.

Alcohol export on cards

A proposal to export some quantity of alcohol is being considered by the Department of Chemicals and Petrochemicals. The proposal is being considered not just in the view of surplus availability of alcohol in the country but also keeping with the recommendation of a committee of technical experts that the economic advantage will be higher if alcohol is preferably used for making higher value added chemicals.

KRIBHCO sets new output record

The co-operative giant, KRIBHCO has set new records in production by producing 14.10 lakh tonnes of urea during the year 1986-87 ending June 30, representing a capacity utilisation of 97.1%.

Plan for Petrochem marketing agency

The Department of Chemicals and Petrochemicals on the recommendation of the Committee for the Perspective Planning of the Petrochemical Industry, is considering setting up a new agency to look after exports, imports and domestic marketing of petrochemical products.

One more oil refinery for Assam

A three million tonnes per annum oil refinery is likely to be set up in Assam under the Assam accord. The refinery will be set up in the joint sector.

Perspective plan for chemicals soon

A perspective plan for chemicals identifying areas of growth, modernisation and technological upgradation will be formulated by the Department of Chemicals & Petrochemicals. A committee to go into this task has been constituted.

HBJ gas reaches Bijaipur

The first of the six gas based fertiliser units began to receive its supply of natural gas. The Bijaipur plant of NFL will use the gas to produce ammonia. Trial runs have commenced and commercial production is expected by year end.

Improved technology to make alcohol

A new technology to make alcohol from molasses which improves yield from 230 litres per tonne of molasses to 280-290 litres and at the same time reduces the BOD levels in the effluent is being offered by J.B. Sawant Engineering Company in collaboration with an Austrian firm.

Alcohol production

The production of alcohol during the year December, 1986-November, 1987 was estimated at 6,900 lakh litres according to an estimate of the Central Molasses Board

CHEMEXCIL sets export targe Rs.750 crores

The Basic Chemicals Pharma and Cosmetics Export Promotion (CHEMEXCIL) has set up an expo for Rs.750 crores for the year 1 Exports during 1986-87 were Rs.56 Exports of bulk drugs is expected t from Rs.80 crores to Rs.160 crore exports of Dyes and Dyes Interme expected to be around Rs 120 crores Rs.91 crores in 1986-87.

Process for making alcohol fron farm wastes developed at I.I.T.

Scientists at the Bio-chemical E ing Research Centre, I.I.T. Del developed a process that converts far like rice straw into alcohol. In lignin can also be recovered and the can be used as fodder. The tec cannot be adopted right away due to cost.

O.N.G.C. improves profit recor

The Oil and Natural Gas Commis registered a net profit of Rs.1484.4 in 1986-87 representing a 14% in profits over the previous year. Cr duction during the year was 27.86 tonnes, while gas supplies were pla billion cubic metres.

New DPCO announced

Drug prices are expected to go u to 20% as a result of the new Dr Control Order (DPCO). The new contains two categories. Category I ing of drugs required for the Nation programme and Category II cons other life saving drugs. The new DP a MAPE of 75% for drugs in catego 100% for those in category II

Tatas seek approval for LAB Pl

Tata Chemicals has sought appr setting up a 50,000 tonnes per year Karnal at a cost of Rs.90 crores. T cipal raw material viz. n-paraffi obtained from the nearby Karnal

SEPTEMBER 1987

IFFCO's Capacity at Aonla ma doubled

In the light of the fact that as

ated fertiliser complexes may
d the Government has decided
ie IFFCO's plant capacity at
al approval is expected after the
t cancels one of the letters of
h have been issued.

a project is now licensed to pro-
tpd of ammonia and 2,200 tpd
eanwhile, the chairman of Tata
Mr. Darbari Seth reasserted his
commitment to the Babrala Fer-
ect.

s to set up methyl thiophenate

Singhania group has received the
al to set up a 200 tpa plant to pro-
yl thiophenate. The plant will be
Ankleshwar, Gujarat.

allow drug machinery imports

re has, in principle, agreed to the
ry's request for allowing duty free
f capital goods and machinery
or export promotion, according to
. S. Deora, Chairman CHEMEX-
ill also consider supply of certain
ials such as benzene, toluene and
ne at international prices to enable
to be more competitive.

to tie-up with M.R.L. for
ject

ate owned Indian Petrochemicals
ion Limited has decided to tie-up
dras Refinery Limited (M.R.L.) to
105 lakh tonnes plant to produce
e plant is expected to be located
ras.

s Policy revised

% increase in the price of sugar
and Khandasari molasses, a hefty
e central excise duty on molasses
30 to Rs.60 per tonne, full excise
molasses used for producing chem-
the main features of a new policy
ses and alcohol announced by the

ck in Arunachal

dia Limited (OIL) claimed to have
l at Kumchai well No.2, in Arun-
adesh. Proper development at this
xpected to yield about 0.5 million

E.I.L. Chooses Vizag for Naphtha Cracker

Engineers India Limited has finalised on a feasibility report for the setting up of a gas based cracker at Vizag. The cracker based on Krishna-Godavari gas is to be designed to produce 1.2 lakh tonnes of ethylene.

Shriram Fibres plans Caprolactum Unit

Shriram Fibres Limited may join hands with Bihar State Industrial Development Corporation (BSIDC) and Steel Authority of India Limited (SAIL) to set up a Rs.256 crores caprolactum plant at Bokaro. E.I.L. has been asked to prepare the detailed project report. The plant is expected to produce 50,000 tonnes of Caprolactum per annum.

Major break through in Controlled Drug Release

A Hyderabad firm, Natco Fine Chemicals, has indigenously perfected and marketed a controlled delivery system. The company has received an award for this technology from the Andhra Pradesh Chamber of Commerce.

I.D.B.I. approves Haldia Petrochem

The Industrial Development Bank of India (I.D.B.I.) has granted approval to the Haldia Petrochemicals project. The Rs.1,452 crore joint sector project will use 1.39 lakh tonnes of naphtha. The project is expected to trigger considerable development in downstream processing in the area.

I.O.C. doubles profit

Over 100% capacity utilisation, sales of over 25 million tonnes, and a doubling of profits were the highlights of I.O.C.'s performance during 1986-87. The profit after tax was reported at Rs.428.22 crores.

I.P.C.L. to develop raw materials for varied uses

The Indian Petrochemicals Corporation

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Limited, will soon begin production of raw materials for the development of household commodities, performance plastics etc. This was stated by Shri S. Ganguly at a function when I.P.C.L.'s polypropylene copolymer plant was dedicated to the nation.

OCTOBER 1987

Alcohol Price to be raised

Keeping in view the recent price increase in molasses, as also the recommendations of the Bureau of Industrial Costs and Prices, the price of alcohol is being increased from Rs.1.07 per litre to Rs.2.30 per litre.

Non-molasses alcohol production to be studied

The government has set up a committee to draw guidelines for production of Potable alcohol from raw materials other than molasses. It will lay down rules for granting licenses as also look into the supply of various alternate materials such as tapioca, mahuaflower, beetroot, spoiled wheat etc.

Licensing of Petroleum Units Suspended

On the recommendation of the Finance Ministry, the Union Government has decided to suspend further licensing in the Petrochemicals industry. The intention is to conserve resources for taking up other high priority infrastructure projects.

Industrial alcohol credit scheme for chemical units

Chemical manufacturers of 26 items can take credit of Rs.258 for consumption of 1 kilo-litre of alcohol. The credit is available only in respect of indigenous ethyl alcohol subject to certain specified restrictions.

Namrup III goes on stream

The Namrup III fertiliser plant of Hindustan Fertiliser Corporation has gone into production. The plant will produce 600 tpd of ammonia and 1,167 tpd of urea. The plant has been designed on a turnkey basis by PDIL and is based on natural gas.

SAIL to produce chemicals

As a part of a major diversification programme, SAIL has decided to go into the production of 30,000 tonnes of ammonium nitrate and 75,000 tonnes per annum of methanol. The new facilities are proposed to be put up at Rourkela at a cost of Rs.30 crores.

I.D.B.I. moots global bidding for fertiliser plants

I.D.B.I. has suggested adoption of a system of international competitive bidding for import of technology, engineering and equipment for setting up of fertiliser plants in India. This is necessary to ensure that the capital costs of new plants are kept to a minimum by securing the best possible prices for imported equipment, technology and engineering.

R.C.F. ranks number one among fertiliser units

With a record production of more than two million tonnes of fertilisers in 1986-87, R.C.F. has overtaken all other producers. Meanwhile, the Gujarat Narmada Valley Fertilisers Company at Bharoch, has recorded an all time high production of urea, ammonia and methanol for the month of July.

NOVEMBER, 1987

Dyes Export touch Rs.98 crores

Exports of Dyes and Dye intermediates at about Rs.98 crores accounted for 18% of the total exports of CHEMEXCIL's item during 1986-87. Major items which have contributed to this excellent performance are Organic Pigments, Reactive Dyes, H.Acid, Metanilic Acid, Gamma Acid, Vat Dyes and other Dye Intermediates.

O.N.G.C.to increase crude oil output

The Oil and Natural Gas Commission has planned to increase crude output by four million tonnes from the wells in the southern and western parts of the country. This is expected to save the country about Rs.930 crores by way of foreign exchange.

Bayer India sets up incineration plant

Bayer India has set up an incineration plant at its Thane works. The unit can handle solid, liquid and gaseous waste and has a capacity of about 6 tonnes a day. The technology is from Bayer AG and Sulzer and the design and engineering has been done by Thermax Pvt. Ltd., Pune.

Government to recover Rs.150 crores from drug companies

The government has decide
with recovery of Rs.150 crore
companies. The unintended prof
to the Drug Prices Equalisatio

Licensing norms for MRTP, companies liberalised

Delicensing for MRTP and
panies has now been extended
tries coming under Appendi
industrial policy and 24 non-
industries, subject to the conditi
are located in backward areas

Price Control on small drug

The Union Government has e
"independent" small drug firms
controls relating to manufactur
egory II formulations. These f
need to be marketed by the com
its own brand name.

New Titanium dioxide proje offering.

Reliance Steel and the Indus
tion and Investment Corporatio
Ltd., (IPICOL) have signed a p
agreement to set up a Rs.150 cr
to manufacture titanium dio
McGee will be the technical c
The plant will initially have a
capacity of 36,000 tonnes per

Imported DAP to be releasec season

The government has ordered
of imported DAP in the market
rent rabi season. The FAI ha
against the decision as the dom
units are nursing unsold stocks
lakh tonnes. This move of the g
is likely to severely hit the do
units, 60% of which have been
many months.

United Breweries to expand petrochemicals

The United Breweries group
take up the manufacture of PM
and aliphatic petroleum resin.
project is to come up in a backw
Tamil Nadu and the latter in Ra
of Maharashtra.

Rs.500 crore loss due to gas

Improper utilisation of gas a

tentatively estimated to port Rs 500 crores per year. natural gas during 1986-87 lion cubic metres.

tion at H.F.L. begins

Fluorocarbons Limited (H.F.L.) ed production as PTFE at its in Medak district. In the five g March 31, 1988 a turnover hs is expected to be achieved.

anufacture polyurethanes

Organic Chemicals (H.O.C.) set up a plant for manufacture polyurethanes. The project is to Rasayani, and a search for a is now on. At present all the d is imported and very little of s are produced in the country.

es CCMB to the Nation

e Minister Shri. Rajiv Gandhi the Centre for Cellular and biology to the nation. The centre realised as a basic centre for modern biology with a multidis- approach.

extract LPG from HBJ

Authority of India Limited, is e possibility of extracting LPG gas being transported along the e. The propane extracted may for petrochemicals. The plant be located at Bijaipur and gov- ction is awaited.

lants for K.G. gas mooted

o meet the growing demand for Andhra Pradesh state, a com- to evaluate prospects for util- G. gas has suggested, the setting 350 tpd capacity nitrogenous te. Alternatively one fertiliser e combined cycle power plant gested. Manufacture of sponge ural gas has been accorded a

ugs brought back under

drugs which were delicensed been brought under the provi- ial licensing

DECEMBER 1987

BTX at international prices for exporters

Mr. N.D. Tiwari, Union Finance Minister, announced that the State Trading Corporation has been authorised to import petrochemicals such as benzene, toluene and xylene at international prices for the purpose of export. Supply of naphtha at international price is also being considered to be added.

Ester India Plant on stream

Ester India's plant in Nainital district to produce 20,000 tonnes per annum of polyester chips, 4,000 tonnes per annum of polyester film and 1,200 tonnes per annum of polyester filament yarn has gone into production. Most of the polyester chips will be for captive consumption.

Saleempur aromatic complex to have a new promoter

With the Pradeshya Industrial and Investment Corporation of Uttar Pradesh (PICUP), unable to find a suitable co-promoter for the Saleempur aromatics complex, the government has decided to cancel the letter of intent granted to it. The search for a new partner is now on and I.P.C.L. is believed to be a strong contender.

Carbide ordered to pay Rs.350 crores

The Bhopal district court has ordered Union Carbide Corporation to pay Rs.350 crores by way of interim relief to the victims of the gas tragedy. Union Carbide will appeal the decision.

Drugs with Vitamins under Category II

The Union Government has notified by way of a clarification on the new DPCO that all drugs containing vitamins will be under category II of the new DPCO. The MAPE for drugs under this category is 100%.

Arcot tanners to get effluent treatment plant

Three industrial co-operative societies in N. Arcot district of Tamil Nadu, will put up common treatment plants to benefit [illegible] tanneries in and around the areas employing nearly 9,500 workers.

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G.F.C.L. plant commences trial production

The Rs.108 crore, three lakh tonnes per annum, diammonium phosphate (DAP) plant of the Godavari Fertilisers and Chemicals Limited (G.F.C.L.), incorporating state of the art technology, has commenced trial runs successfully and will go on stream early next year.

JANUARY 1988

AIDA allowed to export alcohol

Mr. Jaichandra Singh, Minister of State for Chemicals & Petrochemicals announced in the Lok Sabha, that the All India Distillers Association (AIDA) has been allowed to organise export of 500 lakh litres of alcohol. Industry sources are sceptical about the exports being profitable as international prices for alcohol is quite low.

Bengal Drug firms urged to stop loan licensing

Three Public Sector drug units, viz. Bengal Chemicals & Pharmaceuticals Limited, Bengal Immunity Limited and Smith Stanistreet Pharmaceuticals Limited have been urged to stop their loan licensing agreements with private sector companies. This is being done as part of the rehabilitation plans for these drug units.

Import of Vitamin B-6 out of OGL

The government has shifted import of vitamin B-6 and intermediates of pyridoxin to limited permissible category from open general licence (OGL).

Industry Ministry to go ahead with petrochem licensing

In view of the fact that petrochemical projects are a considerable significance for the country, the industry ministry has decided to go ahead with petrochemical licensing, inspite of objections from the finance ministry. Financing, according to the industry ministry, can be obtained from capital markets, as also from financial institutions.

I.P.C.L. to manufacture engineering plastics

In collaboration with General Electric Plastics, I.P.C.L. has decided to manufacture advanced engineering plastics such as polycarbonates and polyphenylene oxide. A proposal has been submitted to the government seeking a letter of intent.

Proposal to make diesel, methanol mix mandatory

On the recommendation of the Indian Institute of Petroleum, the government is studying a proposal making mixing of methanol with diesel compulsory for heavy vehicles. The proposal comes in the wake of a large surplus of methanol expected shortly. Export of methanol by giving support via CCS and supply of natural gas at concessional prices is also being completed.

Research Centre at IPCL inaugurated

A modern pilot scale polyolefins research facility for carrying out research in thermoplastics and elastomers development using novel catalyst systems and state-of-the-art control systems was inaugurated at I.P.C.L.'s complex in Baroda.

Two additional synthetic rubber units required

An expert group under the Department of Chemicals and Petrochemicals has called for the setting up of two synthetic rubber units of one lakh tonnes each. This is to bridge the gap between demand and supply which is expected to reach 2.46 lakh tonnes.

FEBRUARY 1988

Maharashtra cuts industrial alcohol price

The Maharashtra Government has reduced the price of industrial alcohol from Rs.3 per litre to Rs.2.85 per litre in view of the glut in the state.

Rs. 15 Crores allocated for superconductivity research

A co-ordinating committee for research on superconductivity under the chairmanship of Prof. C.N.R. Rao, has suggested an allocation of Rs.15 crores for various programmes. The government has also given approval for this allocation.

Demand for LAB increasing

According to a study carried out by I.P.C.L., in view of the rising demand for detergents, the demand for LAB is expected to go upto 1,45,000 tonnes by 1990. LAB availability is closely to be 1,43,000 tonnes by the end of the decade taking into a the capacities of I.P.C.L. (43,000 t Reliance (50,000 tonnes) and Tamil Petrochemicals (50,000 tonnes).

Baroda Hydrocracker to be ready b

India's first hydrocracker with a ca of 1.2 million tonnes will be ready in The cracker is being set up at IOC's F refinery at a cost of about Rs.635 cr will upgrade residual oil into middle lates of which there is an ever incr demand.

I.P.C.L. to stop subsidy on LDPE

I.P.C.L. has decided to discontin practice of subsidising the cost of im new materials. Consequently the poo of LDPE could register a sharp increas Rs.27,000 per tonne.

Methanol based acetic acid projec opposed

AABIDA has submitted that w installed capacity of over one lakh ton acetic acid from industrial alcohol, r tification for licensing of plants bas methanol exists. The government has g letters of intent to two parties to pr 25,000 tpa of acetic acid through the anol route. Such huge capacities (by standards) may lead to the ruin of mor 22 alcohol based units.

States urged to regulate levies on a

A central directive has asked the st regulate the levies on alcohol, so th export pass fee is not greater than 50 per litre. This is expected to aid the f alcohol from one state to another wh been hampered by irregular duties. The Pradesh government has decided to ment this suggestion.

Commercial production of KG gas

With the supply of 28,000 cubic r of gas to a paper mill in Andhra Pr commercial exploitation of the gas fr Krishna-Godavari basin has comme

G.A.I.L. begins work on spur lin I.P.C.L.

The Gas Authority of India Lin begun construction of a 32 km spur Vagodhia to Baroda. The spur supply 1.2 million cubic metres of to rope in additional users, GAIL uild additional lines in the north- n to feed Ghaziabad, Faridabad, d Delhi Electricity Supply under-

H 1988

's L.I. cancelled

government has cancelled the Letter nt given to Apeejay Fertilisers Lim- setting up a Rs.750 crore gas based project at Shahjahanpur, U.P. The ment will not renew the L.I. which ired on February, 20 on the ground mpany had not taken any steps to exe- e project. The company plans to take case with the government against the llation.

de Intermediates Imports lised

Union Government has liberalised of some raw materials used for pes- manufacture. The raw materials will ilable duty free under intermediate e licensing.

Budget offers concessions to drugs, pesticides industry

iderable concessions in the import on a variety of drugs, intermediates, pesticides and pesticide intermed- ormed the main feature of the budget. duties on most other organic and nic chemicals however, increased. ble excise concessions were granted to ove categories.

Powers for G.A.I.L.

e responsibility of processing, trans- g and marketing natural gas in the will be vested with G.A.I.L. ONGC L have been urged to transfer their ns in these areas to G.A.I.L. The er will be done in phases.

t duty on p-xylene increased

port duty on p-xylene has been ased from 85% to 120%. The landed is now expected to go up from per tonne to about Rs.20,000 per The new import is likely to hit bay Dyeing very hard. The company, dependent on imported material, has sted the increase.

Drug prices go up

Thirteen drug prices have effected sharp hikes in the prices of a number of decontrolled bulk drugs. As per the new DPCO drug companies making decontrolled drugs are allowed to increase the prices although, they are requested to notify the government about such price rises. The government on its part has asked the companies to hold prices at reasonable levels.

Narimanam gas supply begins

ONGC has commenced supply of gas from the oil wells at Narimanam. A steel rolling mill at Nagapattinam has started receiving gas through a 14-km pipeline. In additional, two other units will also be drawing gas to the tune of around 15,000 cubic metres per day.

Naphtha price hiked

The price of naphtha for use by the fertiliser industry as fuel for steam has been increased by almost 100% from Rs.2,048 a tonne to Rs.4,029. Naphtha used as a feedstock however, will be available at the same concessional price. The prices are effective from November 1, 1987.

I.C.M.A. release safety publications.

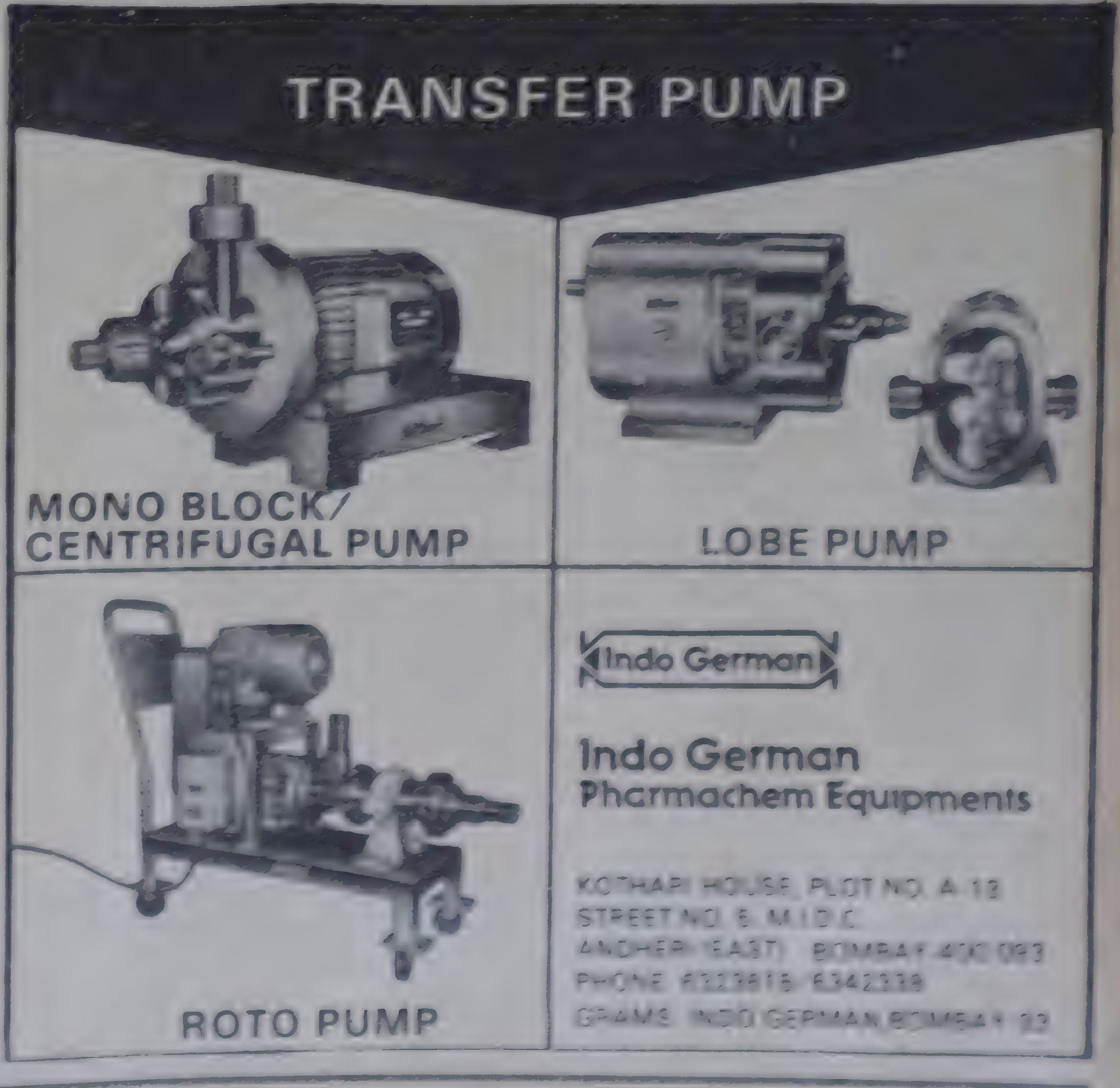
A publication titled "Lessons from Typical Accidents in the Chemical Industry" and a floppy diskette containing Safety data on more than 150 chemicals have been released by the Indian Chemical Manufacturers Association.

No hike in DMT/PTA prices

No further increase in the price of DMT/PTA nor are any imports necessary. This was the conclusion reached at a meeting called by the Department of Chemicals and Petrochemicals with top executives from Bombay Dyeing, Reliance, I.P.C.L. and Bongaigon Refineries.

I.P.C.L. asked to prepare fresh feasibility report on Saleempur Complex

The Union Government has asked Indian Petrochemicals Corporation Limited to prepare a fresh feasibility report on the Saleempur Complex as the earlier one is outdated. The product mix of the complex is also likely to change slightly.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Rs. 32 crores for I.D.P.L. revival plan

The Reserve Bank of India has sanctioned additional working capital of Rs.32 crores to I.D.P.L. raising the total amount to Rs.60 crores. The approach came in acceptance of the report on the performance and functioning of I.D.P.L. by the Government.

IDBI clears Nagarjuna Fertilisers Project

The Rs.635 crores Nagarjuna Fertilisers and Chemicals Limited being set up at Kakinada, Andhra Pradesh has got approval from IDBI paving the way for speedy implementation of the project. Snam Progetti will supply the technology for urea and Haldor Topsoe for ammonia. Naphtha, the feedstock, will be available from Vizag, 150 km away.

HBJ gas reaches Aonla

The second phase of the HBJ pipeline has become operational with the commissioning of a 580 km streach supplying gas to IFFCO at Aonla. The Aonla terminal was inaugurated by the Union Minister for Petroleum, Mr. Brahm Dutt.

APRIL 1988

New Exim Policy announced

A new import export policy for the period 1988-91 was announced. The major objectives of the policy is to stimulate industrial growth by providing easy access to essential imported capital goods, raw materials and components to industry and to promote efficient imports substitution and self reliance.

Gujarat gas cracker okayed

The Project Approvals Board has cleared the Rs.700 crores Gujarat Gas Cracker to be set up by Reliance Industries. The cracker will have a capacity of 300,000 tonnes of ethylene; 150,000 tonnes of HDPE; 10,000 tonnes of PVC and 50,000 tonnes of MEG.

Foreign Companies to be allowed to set up R & D Labs

The Union Cabinet has decided to allow foreign companies to set up 100% R & D units. The move is taken to encourage R & D in high tech areas. The modalities of this decision are expected to be worked out soon.

IFFCO and KRIBHCO: Contendors for Saleempur Project

Faced with break prospects in the fertiliser business the two fertiliser co-operative giants, KRIBHCO and IFFCO have evinced interest in the Saleempur Aromatics Project. The other companies being considered for the project are I.P.C.L. and J.K. Synthetics. A final decision is expected soon.

U.C.C. directed to pay Rs.250 crores as interim relief.

The Madhya Pradesh High Court upheld the decision of the Bhopal District court and urged Union Carbide to pay Rs.250 crores as interim relief.

Price curbs on non-molasses alcohol relaxed

Potable alcohol made from sources other than molasses will not be subjected to price control. An industrial licence is however, obligatory before setting up capacity in this line.

Sudarshan Chemicals to set up waste treatment plant

Sudarshan Chemicals has finalised an agreement with a US firm, Radian Corporation, for setting up a Rs.3 crores waste treatment facility. The plant will treat waste water, solid waste atmospheric pollutants etc.

SPIC, JK group and Reliance short listed for MRL Project

The choice of a co-promoter for the MRL aromatics complex will be made from one of SPIC, JK group and Reliance Industries. I.P.C.L. is also believed to be in the group.

GHCL's Soda ash plant opened

The President, Mr. R. Venkataraman, inaugurated a Rs.287 crores soda ash project near Veraval in Gujarat. The plant being jointly operated by GHCL and the Dalmias will produce 1,200 tonnes per day of soda ash.

Pesticide Formulators Association Protest Patent Law Modifications

The Pesticides Formulators Association have protested against the Central Insecticide Boards plan to modify section 9 (3) of the Insecticides Act to provide protected registration for five years to the first registrant

Nitrogenous fertiliser output marginally higher

Inspite of problems such as po
water shortages and poor offtake, p
of nitrogenous fertilisers for 19
placed marginally higher at 5.4
tonnes. Production of phosphatic
is placed at 1.66 million tonne
around the previous years level.
utilisation is expected at around

Bindal Agro Acquires IEL's Pl

IEL's Rishra plant with a ca
15,000 tonnes per annum of LDPE
taken over by Bindal Agro Chem
moved to Delhi. The plant uses a
a feedstock and has been purch
Rs.10 crores. Commercial product
new site is expected in early 198

IPCL increases prices on LDPE

IPCL the sole producer of LI
increased its price by Rs.3,500 a

Gujarat to set up container faci Hazira

A chemical container facility fo
both cryogenic and noncryogenic ch
is proposed to be set up in Hazira
ject will cost Rs.75 crores and wi
submarine pipeline allowing large
ships to come to the Gujarat Coast
minal will hold better stocks of pet
icals protecting the country, atleas
from the ravages of international pr
tuations.

MAY 1988

Duty free imports for Pesticides extended

The Government has decided to
the list of items which can be impo
of duty under the condition that they
for manufacturing pesticides me
export. The list is currently under p
tion by the Department of Chemic
Petrochemicals.

Cochin Refineries to make LAB

Cochin Refineries Limited (C
sought a letter of intent for a Rs.2
project for the manufacture of LAB
while, the aromatics recovery unit
is expected to be commissioned b
ary 1989. It is expected to meet
benzene requirements of FACT an

elop Petrochemical Industry
p

omprising of senior representa-
RL, the Tamil Nadu Chemical
ssociation, and agencies like
TIDCO, has been set up to aid
ent of the petrochemical indus-
ate.

ial bank for Petrochemicals

Khan has suggested the setting
material bank which could be
anufacturers to overcome pro-
ting import of Petrochemicals.

testing centres to be set up

ual drug and pharmaceutical
being set up to finance 5 drug
res at an estimated cost of Rs.25
hey accrued in the Drugs Prices
n Account will be used for this

ort duty down to 90%

ion of 65% in the import duty of
ne glycol has been announced.
nous capacity of MEG at 1,800
month meeting only about 25%
us demand, the bulk of the raw
quired is imported.

r units seek to double capacity

e fertiliser units at Jagdishpur,
Guna are likely to be doubled in
ties. GAIL has verbally assured
panies of adequate gas supplies
ication seeking a letter of intent
approval from the government.

units urged to prefer PTA

ester staple fibre (PSF) and pol-
ment yarn (PFY) units which can
TA and DMT as raw material
urged to use PTA as the raw
m July. The move is reportedly
supply position and ensure com-
tion of all indigenous raw mater-

o spur growth

ge of tax concessions and exem-
offered by the Tamil Nadu Gov-
V.C. Alexander, to spur industrial
the state. Power concessions, single window clearance for certain projects, and sales tax concessions are some of the main features.

Rama Petrochem goes on stream

Rama Petrochemicals 50,000 tpa methanol plant at Patalganga, Maharashtra has gone on stream. The company has reported a purity of 99.9% for the product and the technology is the latest low pressure one developed by Lurgi GmbH of West Germany.

RCF setting up a DMF plant

Rashtriya Chemicals & Fertilisers is putting up a 2500 tpa plant to manufacture dimethyl formamide. The plant will cost Rs.6 crores and will use dimethylamine as the main raw material. This will be available from the companies plant at Trombay. The DMF plant is expected to be located at Thal.

NOCIL, PIL may distribute PVC, HDPE

NOCIL and PIL may be asked to distribute PVC resin and HDPE. The move is meant to curb the steady uptrend in prices of most commodity plastics in the local markets. A pooled price may be introduced considering the wide disparity in the prices of indigenous and imported material. All commodity plastics are now allowed under OGL.

IFFCO plant goes on stream

The Aonla plant of IFFCO has gone on stream. Commercial production will begin in three months time. The plant is to produce 7.26 lakh tonnes of urea and 2,000 tpd of ammonia.

JUNE 1988

MEG prices Soar

The Association of the Synthetic Fibre Industry has appealed to the government for

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substantial reduction in the import duty on MEG in view of the steep rise in the international market. With the import duty now at 90% and international prices ruling at around $1,000 per tonne, landed costs have become astronomical.

Subsidy for molasses export under study

The Union Government is considering the possibility of subsidising molasses exporters in U.P. The extent of subsidy is likely to be the cost of transporting the material from the distilleries to the ports. Molasses surplus this year is put at around 10 lakh tonnes, a bulk of which is confined to U.P.

Gujarat Insecticides commence production of Monocrotophos

Gujarat Insecticides Limited (GIL) has successfully started manufacturing technical grade monocrotophos. The technology for this pesticides has been developed indigenously at the companies R & D laboratories.

Major liberalisation in licensing

In a major liberalisation measure the Government has exempted from licensing all industrial investments made by non-MRTP and non-FERA companies up to a limit of Rs.50 crores, if these are located in any backward area and upto a limit of Rs.15 crores in case of investments outside 21 specified cities. The number of industries for which licenses must obtained have also been reduced.

BPCL to diversity into Petrochemicals

Bharat Petroleum Corporation Ltd., plans a number of projects based on Bombay high crude. A naphtha cracker complex is proposed to be set up at a total cost of Rs.1,320 crores, to make polyethylenes (110,000 tpa), alpha olefins (100,000 tonnes) ethylene glycol (60,000 tonnes) and acrylonitrile (90,000 tonnes). A project report to make SBR, polyisoprene, isobutylene and MTBE has also been prepared.

10,000 tonnes of Carbon Black to be imported

The Union Government has decided to import 10,000 tonnes of carbon black and 30,000 tonnes of feedstock. This follows representations made by the tyre industry to the effect that shortage of carbon black might adversely affect production.

PTFE import norms likely to be changed

The Government is likely to increase the import duty on PTFE since at the prevailing rates the landed cost of imported material works out about 10% lower than indigenous material. Hindustan Fluorocarbons Limited, a subsidiary of HOC, has started production of PTFE under the trade name HIFLON, and has an annual capacity of 500 tonnes.

Three LAB projects to be cleared

The Project Approvals has cleared two projects for LAB manufacture. They are Hindusatan Lever's Project at Karnal and Nirma's Project at Vishakapatnam. A third project is also expected to get clearance soon. This project is to be based in Mathura will go to either Grasim Industries or Straw Products. After PAB approval, the three projects need approval from the Cabinet Committee on Economic affairs.

Rs. 5 crore compensation claims from Shriram gas victims

4,600 people affected by an Oleum gas leak from the works of Shriram Foods & Fertilisers have filed claims for Rs. 5 crores in the Delhi Courts. The claimants are assured of winning damages as the Supreme Court has already upheld the principle of absolute liability on an industry. The quantum of compensation now remains the legal issue.

Reliance to get naphtha at concessional rate

With the petrochemical complex at Raigad being accorded a refinery status naphtha consumed for making para-xylene will be made available at a concessional excise duty of Rs. 30 per kilolitre. Normal excise duty on naphtha is of the order of Rs. 3,000 per kilo litre. The order is expected to save the company well over Rs. 150 crores.

JULY 1988

Paraxylene for PTA gets excise exemption

The government has decided to exempt paraxylene from excise duty if it is consumed within the factory for the manufacture of purified terephthalic acid (PTA). This concession was earlier available only for DMT manufacture.

Soviet knowhow for HOC's MDI Projects

HOC which is planning to set up a 10,000 tpa plant for MDI production is to seek technological help from the Soviet Union. An understanding to this effect is expected to be signed by the end of the year according to HOC Chairman and Managing Director, Mr. H. Krishnamoorthy. India's consumption of flexible and rigid polyurethanes is estimated at 5,000 and 3,000 tonnes respectively.

Revision of Pencillin G Allocation Policy urged

With drug units making 6-APA from Pencillin V able to get their raw material at cheaper rates, units going the Pencillin G route are being put at a price disadvantage. The latter have necessarily to lift 40% of their requirements from indigenous sources at prices significantly higher than that of imported materials. Pencillin V users can however, lift their entire requirements through imports.

Distribution Policy for canalised drugs announced

A new distribution policy covering DGTD units, small scale units and loan licence units, valid for three years has been announced. Under this policy each DGTD unit will get drug materials based on its formulation capacity with an annual growth of 25%.

India's Fertiliser import bill to go up

India's Fertiliser import bill is likely to go up in 1987-88 on account of a spurt in international prices. This year the country is expected to import 0.25 million tonnes of Phosphate and 0.95 million tonnes of Potash. No nitrogen imports are contemplated this year inview of the glut in urea. Prices of nutrients are higher by 10 to 15% in international markets this year largely because, of China's entry into the market.

40,000 tones of LAB to be exported

A one time export of around 40,000 tonnes of LAB has been permitted. Reliance Industries is likely to be the major exporter but, the other two producers are also likely to have a share of the exports. The exports have been permitted considering the poor offtake by the main users viz. Nirma and Hindustan Lever. Both these companies are nursing adequate stocks of imported material.

American 6-APA technology not to be imported

The National Register of Foreign Collaborations has recommended that further import of technology for ampicillin and 6-APA be suspended unless radically new technology is available. The study is aimed at a critical study of the imported technologies vis-a-vis indigenous ones.

Benzene imports are likely

Increased benzene consumption particularly by units making LAB, and phenol has lead to a shortfall of benzene. This is expected to continue until the Cochin Refineries goes on stream which is not likely till early 1989.

The margin issue to be referred to Kelkar Panel.

In a meeting with manufacturers of drugs, the Industry Minister, Mr. J. Vengal Rao has suggested that the controversial trade margins issue be referred to the Kelkar Committee.

Vanillin projects cleared

IDL Chemicals Limited's project to manufacture 50 tpa of ethyl vanillin and 150 tpa of vanillin has been cleared. The Rs.300 crores project will be set up by the Modella group in Medak District of Andhra Pradesh. The technology has been indigenously developed and no foreign exchanger outgo is involved.

MCA project of Modi's gets approval

A project for making 2,000 tpa of monochloro acetic acid (MCA) by the Modi Group has been given the rod. The project to be set up in Alwar District of Rajasthan, is estimated to cost Rs.180 lakhs. MCA demand is put at 8,000 tpa, while production is placed currently at 5,000 tpa. The raw materials for the plant will be drawn from the companies plant at Alwar representing a gainful utilisation of available chlorine.

No further registration under Insecticides Act

The Registration Committee of the Central Insecticides Board has decided to cease further licensing uner section 9 (4) of the Central Insecticides Act. The provision will ensure the original registrant protection on this market. The move is expected to draw the line of the small manufacturers.

Polymer imports tied up

270,000 tonnes of Polymers are to be imported in the period of July-March in addition to the 48,000 tonnes made in the period of April-June. 79,000 tonns of LDPE and LLDPE; 63,000 tonnes of HDPE; 15,000 tonnes of PP; 100,000 tonnes of PVC; and 6,000 tonnes of PS are slated for import during this year. The material will be sold at a uniform pool price.

Multinationals show interest in Petroleum complexes

For multinational giants — Shell of UK, Mitsui of Japan, Linde of West Germany and British Petroleum of UK — have submitted proposals for investment in Petrochemical complexes being set up in the country. The World Bank has also shown interest in financing the Hazira Cracker complex. The government is examining all these proposals.

PVC, Polyestyrene prices up

NOCIL has increased the price of PVC by Rs. 2,250 per tonne while Polychem and Hindustan Polymers have increased prices on PS by Rs.3,000 a tonne. The All India Federation of Plastic Industries has complained that this move will severely hit the small scale processing units.

First Iron Fertified Salt Project Commissioned

The State owned Tamil Nadu Salt Corporation (TNSC) has commissioned its finest Iron Fertified Salt Project (IFS). The project with a capital cost of Rs. 25 lakhs is funded by UNICEF and the Government of India's Food Nutrition Board.

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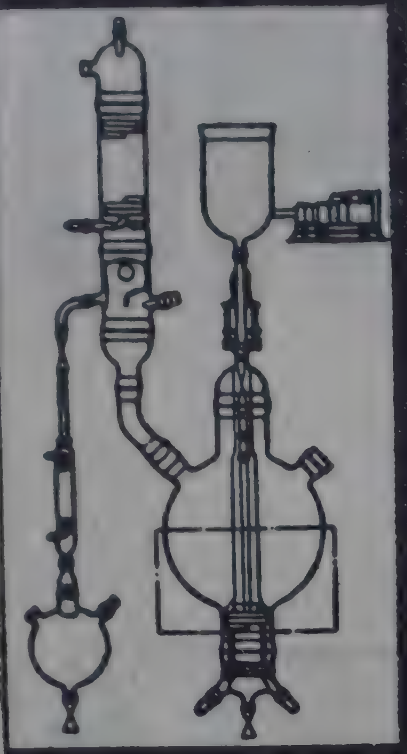

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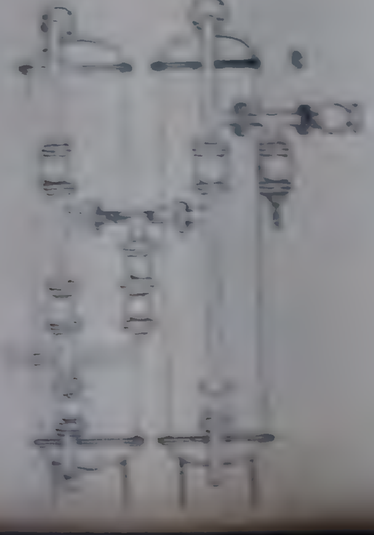

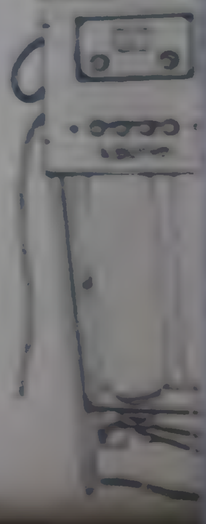

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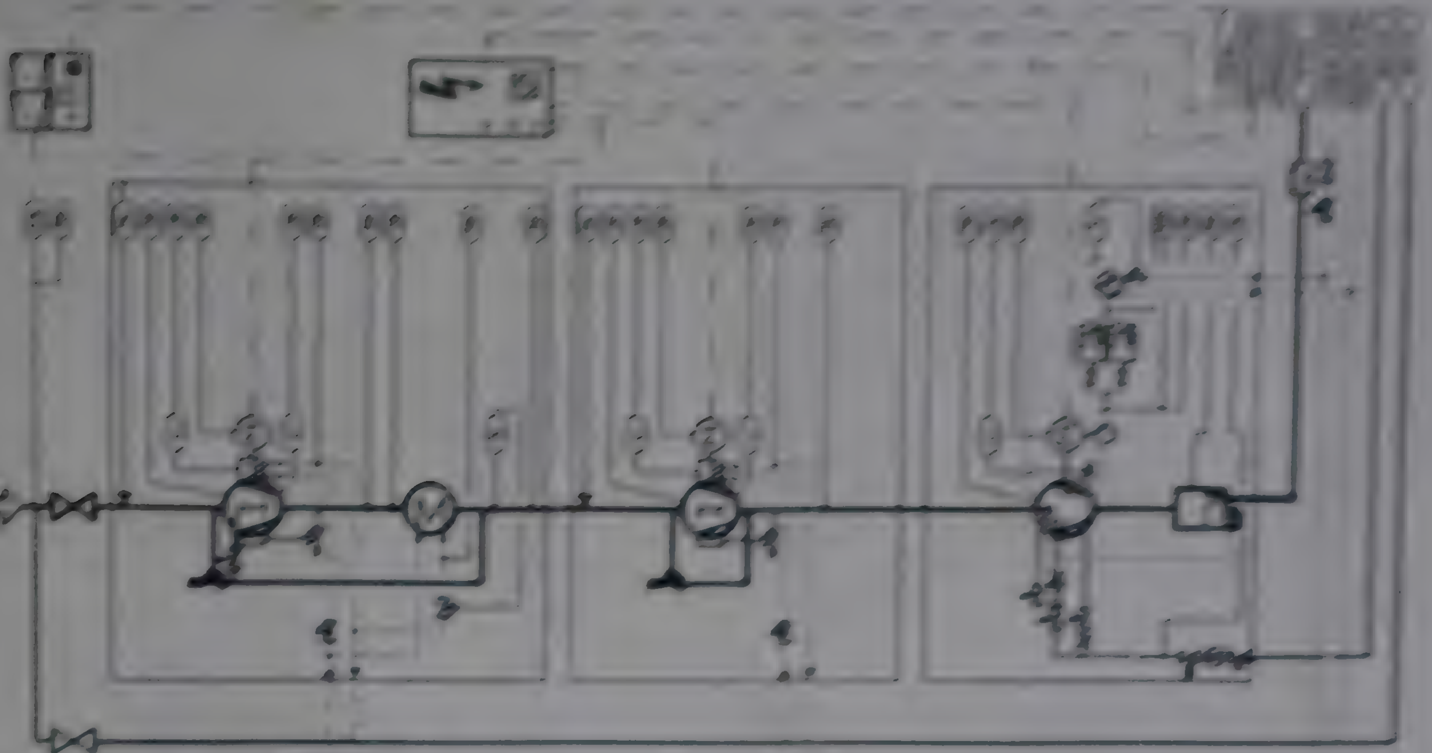

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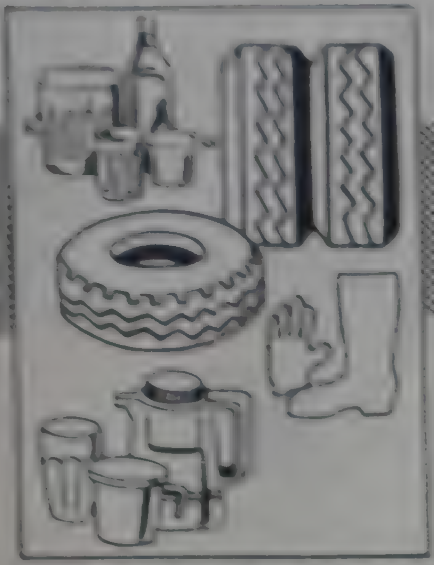

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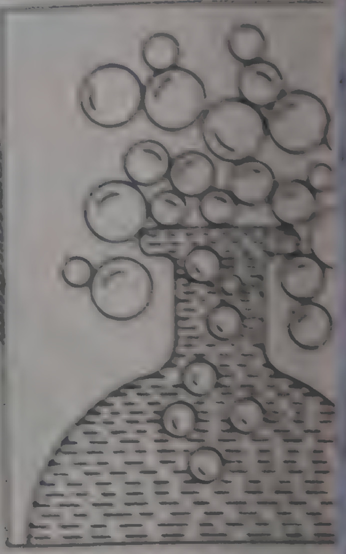

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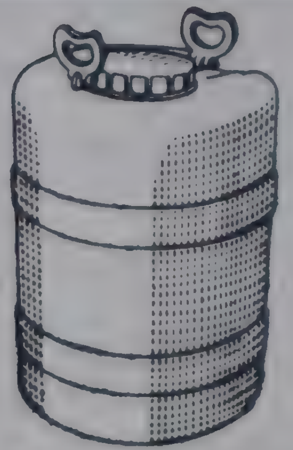

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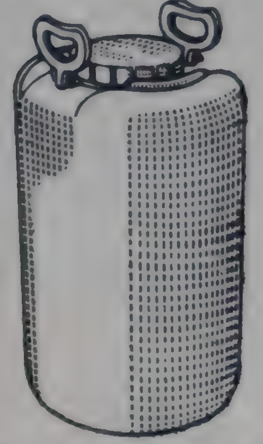

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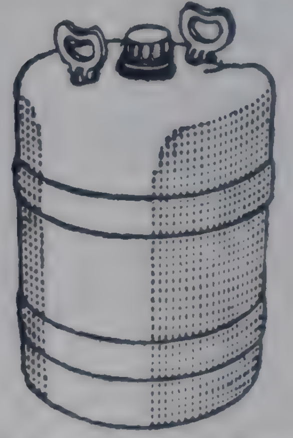

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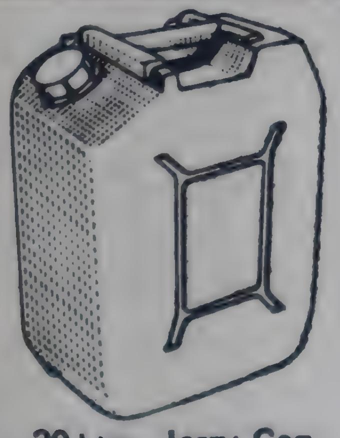

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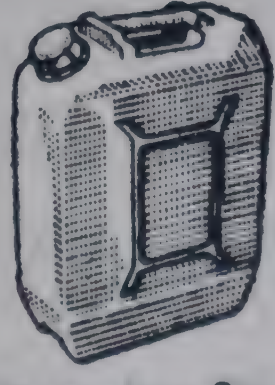

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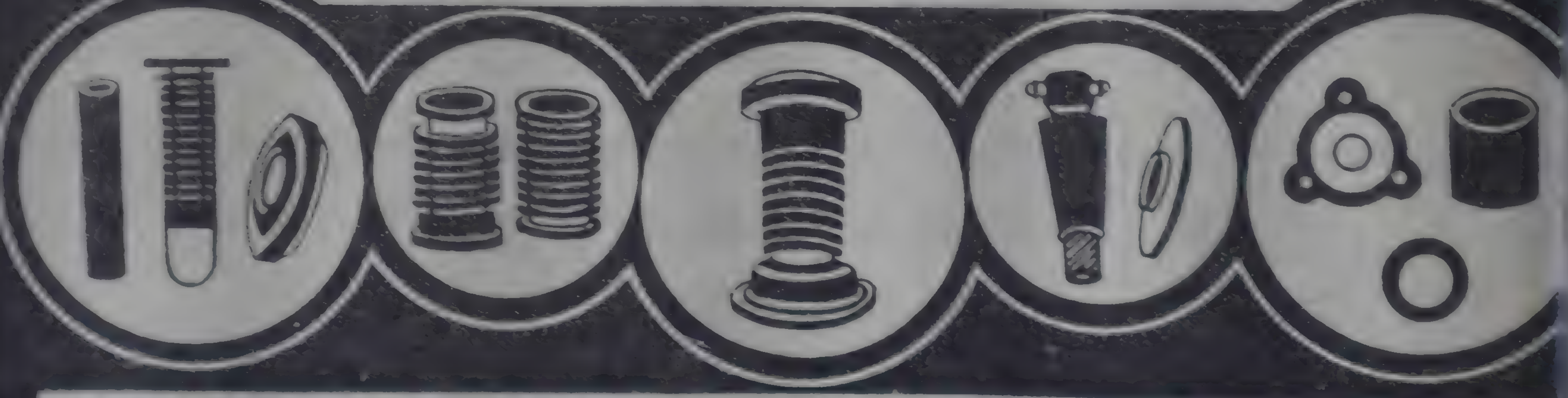

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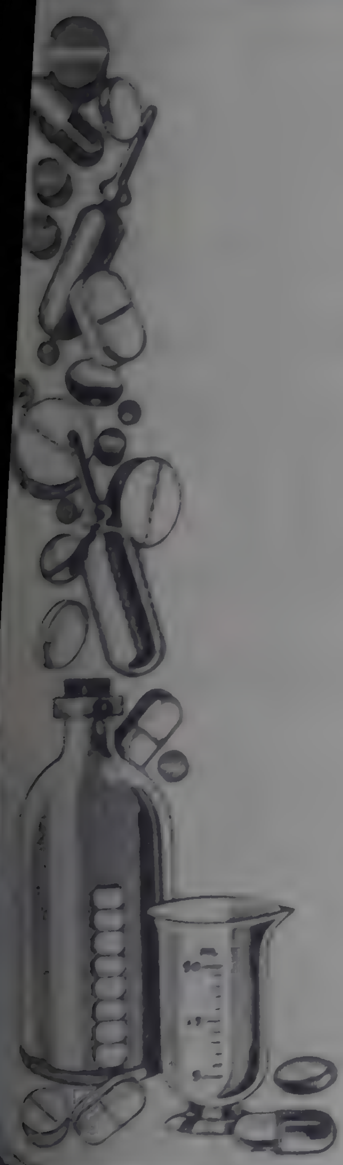

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CHEMICAL
WEEKLY

VOL. XXXIII AUGUST 16, 1988 NO. 49

Fertiliser Scene: Disturbing Trends

Agriculture continues to be at the core of pid economic growth in India despite industria-ation during the past three-and-a-half decad- Its share in national product at present is percent at current prices and 35.4 per cent at nstant 1970-71 prices. Out of a total work rce of about 244 million, nearly 60 per cent is onomically dependent on agriculture. About per cent of the total population resides in ral areas deriving livelihood essentially from riculture and related activities. Besides the ntribution to the national product, agriculture rovides a demand base for ensuring rapid in-strial growth.

Studies made by FAO (Rome), as well as he Fertiliser Association of India have revealed hat for every additional tonnage of fertiliser used there has been a minimal increase of 10 onnes of foodgrains.

In spite of our commendable achievement on the agricultural front, there is no room for omplacency. The per hectare average yield of oodgrains of 1377 kilograms is not only lower than the Netherland's 5870 kilograms or Ja-pan's 5715 kilograms, but even lower than the orld average 2370 kilograms. It is worth entioning in this connection that the Japanese griculture is characterised by the ridiculously mall size of its holdings. There is no scope, nor any hope of extension of cultivation, be-cause of the hilly nature of the country and the existence of live volcanoes in a large part of the islets. In spite of these constraints, the Japanese ultivator is able to augment his productivity through intensive cultivation of the available land by using maximum amount of fertilisers than any other country in the world and it is now one of the countries which are on the fore-front as far as per unit productivity of land is concerned.

The National Commission on Agriculture has projected that our population will be 935 million by 2000 A.D. and the food requirement 225 million tonnes. The task ahead, therefore, is of great magnitude and the nation will have to rise to the occasion to meet the requirement of food.

The energy crisis of the seventies has left a lasting impact on the fertiliser industry.

Oil crisis of the early 1970s affected the fertiliser industry in two ways. Prices of fertilisers in the international market hit the roof. These went up by as much as 200 to 300% in a matter of months. Fortunately, these absurd prices did not last too long.

Its other major effect was that the capital cost of setting up fertiliser plants rose very sharply. It would not have been possible to service this investment and yet sell fertilisers at a price which could subserve our overall economic objectives of fostering agricultural growth and making foodgrains available to the consumers at a reasonable price

No new investment would have been viable under such a situation. Even plants like SPIC and MCF which were in advanced stages of construction at that time, were adversely affected A way had to be found to resolve the dilemma This problem was remitted to the Fertiliser Prices Committee (known as the Marathe committee). The government's acceptance of the recommendations of this committee was the genesis of the current fertiliser retention price and the subsidy system. The twin objectives of the system briefly were to sustain and stimulate consumption of fertilisers by making these available to the farmers at an affordable price, and foster growth of domestic production by making investment in the industry economically viable.

This single farsighted decision of the government (on retention price and subsidy systems) changed the market perception with regard to the fertiliser industry. It was perceived to be the "industry of future". Entrepreneurs were willing to invest large sums of money in the industry despite the risks inherent in a capital-intensive high technology industry.

This has also led the critics to claim that it is cheaper to import fertilisers than to manufacture the same.

The demand for Nitrogenous and phosphatic fertiliser is projected at 91 lakh tonnes of Nitrogen and 30 lakh tonnes of P_2O_5 at the end of the seventh plan (1984-90). With the installation of all the new fertiliser plants under implementation the fertiliser capacity is expected to go up to about 84.44 lakh tonnes of Nitrogen and 25.90 lakh tonnes of P_2O_5. Production from this capacity would however fall short of the expected demand of fertiliser at the end of the seventh plan. Import of Nitrogenous and Phosphate fertilisers, would therefore continue to be necessary so as to meet the full demand and ensure adequate availability.

The Varadarajan Panel has suggested a drastic change in approach to the fertiliser sector particularly with regard to the role of imports versus indigenous production for meeting the increasing internal requirements.

With respect to phosphate fertilisers dependence on imports is recommended. Even with regard to nitrogenous fertilisers, where the domestic resources are available in abundance, the so called "Make versus buy" option has been suggested with emphasis on the latter.

In fact, out of an estimated deficit of about 51 lakh tonnes of fertiliser by 1994-95, it has been suggested that the requirement of about 35 lakh tonnes could be met through both imports of urea and DAP while for meeting the balance, necessary additions to indigenous capacity could be considered.

The case in favour of imports apparentl involves two basic presumptions (i) easy avail ability of fertilisers from abroad and (ii) tha imports will be cheaper than indigenous pr duction.

With regard to the assumed comfortabl global supply situation, it is abundantly clea from the MMTC's paper given in the report tha as per the FAO forecast the deficit of nitroge for the world as a whole is expected to increas to 1.13 million tonnes in 1989-90. Even th World Bank/FAO/UNIDO projections presente at a fertiliser working group meeting in mid 1987 forecast a deficit of 0.98 million tonne of nitrogen in the world demand-supply balan ce by 1991.

Further, a tightening situation is anticipate in nitrogen for the next few years as there i little ammonia capacity being built particularl in view of the low realisation prices from th exports and the high capital cost of comission ing new projects making further investmen economically unviable. In view of this, the as sumption that urea imports to the tune of fou million tonnes could be conveniently arranged and with some advance planning could even b increased to six million per annum is fallacious

The assumption that the imports are likel to be cheaper than indigenous production i grossly misleading. In fact, it will be erroneou to look merely at the world market prices a any particular point of time and compare them with the cost of indigenous production from new plants. In view of the cascading effect of input prices which are substantially and unrealistically higher than those available to the fertiliser industry in the exporting countries, their production costs are not comparable.

In particular, the aspect of lower prices until 1986 which were at near dumping levels not covering even the cost of feedstock in the exporting countries needs to be kept in view. In fact, at these prices the fertiliser industry the world over suffered heavy losses. The North American industry alone incurred a loss of $ 500 million during 1986. During 1987, these prices firmed up by $ 30-32 per tonne in respective of

(Continued on page 44)

CHEMARENA

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PVC in tight supply

PVC was at one stage looked down upon and several producers shut down or sold off to avoid losses. From 20 producers in 1979 there remained only 13 in 1987. But the situation has changed in USA and as would be expected, with impact on the rest of the world. For over five years the production has been rising and has picked up from a low of 4.8 billion pounds in 1982 to nearly 7.4 billion pounds in 1987 and expected to touch 8 billion by 1990 — representing a 100% utilisation of present capacity. There is a wave of additional capacity through debottle-necking etc. to meet the tight situation.

The construction industry is a prime area of PVC products — piping, electric wires and cables, siding and window frames, flooring etc. The housing starts picked up when interest rates in US fell recently adding buoyancy to the market. The Canadian plants with their close links to US producers have provided VC monomer or PVC to meet the shortfalls. The price relation between Ethylene, VCM and PVC has shifted in favour of the polymer with the larger margin. As of 1988 it is reported that Ethylene prices are about 16 cents/lb, VCM about 20 cents and PVC at a peak of 36 cents/lb.

In the use pattern vinyl doors and windows have grown at high rates to over 1,00,000 tonnes and rigid PVC accounts for 75% share of consumption. Technical developments cover better stabilisers, blending with impact modifiers like MBS and chlorinated polyethylene etc. A big decline is in the compression molded records — one fourth of early record 200 million pounds — due to the invasion of cassettes and compact discs of poly-carbonate. Also PVC blow molded bottles have given way to other plastics. In the medical field PVC is the preferred material for blood/serum/fluids transfusion, disposable gloves, IV bags and tubes etc. A detailed percentage-wise use of PVC currently in USA is said to be as under.

End Use	Percent
Building & Construction	
Pipe Conduit, fittings	45
Siding and accessories	8
Profiles, flooring	9
Wall covering etc.	3
Packaging	
Film, Closures & Coatings	6
Electrical & Electronics including	
Wires and Cables	7
Medical	6
Appliances, furniture, toys, housewares	4
Transportation	2
Misc — credit cards etc.	8

India has to import 60% of the PVC requirement and the monomer for 10% of the production a sad state of affairs in the present situation of world-wide tight supplies and high prices.

Pervaporation

The advent of membranes has created a whole new dimension in separations to the initial stages of reverse osmosis for water desalination. The separation of gases like hydrogen from mixtures has proved to be attractive. Polymers manufactured are quite selective and stable with respect to organic components with solvent properties. Mixtures of water and several organic components can be dewatered economically and it is possible to consider recovery of solvents from paint drying by means of gas permeation. In pervaporation the feed mixture is a liquid and the permeate is a gas. Mass transport in the membrane is based on sorption and diffusion in the membrane phase and the driving force is the difference in electro chemical potential across the membrane.

One interesting pervaporation process now fully commercial is for dehydration of alcohol to 99.7% from as low as 90%. This is said to be cheaper than the azeotropic distillation. Gesselschaft for Trenintechnic (GFT) of Hamburg near Saarburcken have designed the equipment with a composite membrane — from poly-acrylonitrile coated with polyvinyl alcohol on metal supports — with high flux and sel tivity. GFT is said to be supplying the sepa tor to many chemical and pharmaceutical fi and the target operation is for a 1,50,000 l ethanol plant near Rheins, France. It is clain that for a 30,000 l/day dehydrated ethanol pl there is a saving of 2.6 cents per litre of etha due to lower investments, and energy needs. smaller units the savings could be more. GFT said to have been acquired by a French comp in which Perchiney have a major share.

Methane to Ethylene

Production of ethylene directly from methane is of tremendous economic significance for it can sidetrack the synthesis gas route of high investments and costs. This will also open a new chapter in C_1 chemistry. But so far there is not much success and various methods of activating methane to form a CH_3 or CH_2 radicals are being investigated. An easy way is via. halogenation but could be ultimately too costly. It is now reported that Johnson Mathey (the precious metals group) are on the way to a potentially useful way. The process uses metal phosphate catalysts for oxidation of methane and yields mostly ethylene with traces of C_3 or higher. There is little of carbon build up on catalyst surface, although no details of catal are available. Experiments are reported have conversions of 25% of methane with 4 as ethylene Some carbon oxides are also forn Catalysts are said to be very active and capa of high space velocity of feed at about 850 But far more work on process optimisation necessary. One potential use will be to conv the methane of naphtha cracker but this w create problems on fuel/energy needs. There a possibility of adding 25% to the ethylene naphtha cracking by this method.

Union Carbide restructures

While the Government of India's claims on Union Carbide India Ltd. for the havoc caused by its Bhopal plant disaster are locked up in court battles the parent company has been restructuring its operations and finances in the aftermath of this disaster so as to make itself less vulnerable due to large claims. Takeover attempts by parties like General Aniline were warded off by sale of some productive assets and lowering the debts and along with a massive payment to shareholders as a bonus from the capital gains. Union Carbide is now a better organised corporation. The recent changes are to further restructure its world-wide businesses into :

1) Chemicals and plastics
2) Industrial gases
3) Carbon products.

These will be separate subsidiaries with UCC as holding company and this move creates a legal and financial structure freeing them to ma their own decisions in the interests of grow and stability.

UCC is also going ahead on new proje which includes their top class Unipol proc aligned to produce newer range elastomers well. These new polymers will have flexibil and are to be termed "Flexomers". A reac of 1,00,000 tonne capacity is to be converted the "Flexomer" production as alternative to po ethylene. Also UCC is to start a new produ tion of ethylene oxide/glycol which had b phased out partly and will add 5,00,000 ton per year on an investment of $ 400 million.

UCC is able and confident enough to go for new assets and perhaps may be in a bet frame of mind to settle the Indian claims, pa cularly if the US Government takes a hand

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SALEEMPUR AROMATICS COMPLEX:

JK Synthetics favoured

The industry ministry has recommended that the Rs. 900-crore Saleempur aromatics project should be awarded to J.K. Synthetics of the Singhania group of companies. The other major contenders for the project were Reliance Industries and Grasim of the Birla group.

The proposal is expected to be considered by the Project Approvals Board by the end of this month.

The ministry, according to official sources, decided in favour of the Singhanias because the other contenders already have sizable petrochemical projects in hand.

Reliance Industries which was earlier a front runner in the race to bag the project has been selected to implement the Hazira petrochemical complex. Similarly, the other important company in the race, Grasim Industries, has been awarded the Mangalore project.

Since both Hazira and Mangalore complexes involve investments running into hundreds of crores of rupees, it was felt that the Saleempur aromatics complex should be awarded to another private company.

The Saleempur complex which will be based on naphtha from the Mathura Refinery will produce 150,000 tonnes of purified terephthalic acid (PTA), 100,000 tonnes of benzene and 108,000 tonnes of paraxylene per annum. In addition, the complex will manufacture 35,000 tonnes of orthoxylene, 50,000 tonnes of cyclohexane and 35,000 tonnes of return raffinate.

A decision on the project's promoter has already been considerably delayed. The complex was to have been set up in the Seventh Plan period, but it will now spill over to the Eighth Plan.

A letter of intent was initially issued to the Pradeshiya Industrial and Investment Corporation of Uttar Pradesh (PICUP) in March 1986. PICUP was to be the co-promoter of the project which was then proposed to be set up in the joint sector.

Even after a year, however, PICUP was unable to finalise its choice of a private sector partner. A screening committee had been set up to shortlist the prospective companies, but PICUP failed to take a decision on its recommendations. At that time, it was widely rumoured that Reliance Industries would be awarded the contract.

Since the UP company took such a long time to arrive at a decision, and it was felt that it was relatively inexperienced to handle such a huge project, the government decided not to renew the letter of intent. Instead the project was thrown open to the private sector.

The IPCL was also considered for the project, but in view of its preoccupation with the ongoing Maharashtra Gas Cracker complex as well as the likelihood of implementing the Vizag complex, it was decided to opt for a private company.

DRUGS CATEGORIES: 2 MAJOR CHANGES RECOMMENDED

The Union health ministry is understood to have recommended two major changes in the drug categorisation under the new Drug Price Control Order, it is learnt.

The health ministry has suggested that vitamin A bulk should be brought under category I of the DPCO. Presently all bulk vitamins including vitamin A are outside price control.

It has also suggested that paracetamol, a widely used analgesic, should be shifted from the present category I of the new DPCO.

The recommendations of the health ministry are to be considered by the Kelkar committee which has been entrusted with the work of finally deciding the categorisation of drugs.

It appears that the main reason behind the health ministry's recommendation to bring vitamin A under price control is that the drug is used for the treatment of blindness.

The health ministry has noted with concern the recent sharp hikes in the prices of vitamin A and some other bulk vitamins by drug manufacturers after the announcement of the DPCO, 1987.

In the case of paracetamol, it was not considered a life-saving or essential drug in the 1978 drug policy it is only an analgesic. In the DPCO, it is listed in category I a anti-malarial drug.

Although paracetamol is used malaria treatment as the disease is ways accompanied by high feve is not considered as an anti-mala the sources point out.

Meanwhile the Kelkar committee up for categorisation of drugs ur the new DPCO, has received repres tations from 25 drug units pertair to classification of 33 drugs listed both the controlled categories.

The government has listed a tota 26 essential drugs in category I and drugs in category II for price cor in the new DPCO.

The Kelkar committee is expec to hold its last sitting in New D to finalise its recommendations on c categorisation.

SEMINAR ON "ROLE OF PLASTIC IN PACKAGING OF FOOD PRODUCTS"

The Seminar on "Role of Plastics Packaging of Food Products" organis by the All India Plastics Manufact ers' Association and scheduled to held on Saturday, the 13th Augu 1988 at Hotel Hyatt Regency, N Delhi has been postponed to **Saturd the 20th August, 1988.** The Hon' Minister, Shri Jagdish Tytler has co firmed he will inaugurate the Semir on 20th August at Hotel Hyatt Regen and the programme will remain same for the new date. The initial re ponse has been overwhelming and is requested that registrations be se early to AIPMA office to facilitate ad quate arrangements for all.

BULK IMPORT OF DMT PLANNED

The Union government is understo to be considering a bulk import DMT to meet any emergency raw m terial need of the polyester industry

The authorities are initially plann to import 20,000 tonnes of DMT tc canalised through STC or IPCL, acco ding to informed sources.

This will be in addition to the clea ing up of individual units of DMT in port applications on priority basis. th sources added.

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Dr. O. P. KHARBANDA

Frankly Speaking

O. P. KHARBANDA, Cost & Management Consultant,
501, Olympus, Altamount Road, Bombay-400 026.

(Dr. Kharbanda, a Fellow of the Institution of Chemical Engineers, is a visiting professor and an author of rep
Latest title: SAFETY IN CHEMICAL INDUSTRY — Lessons from Major disasters, Heinemann, 1988. He consults
UNIDO.)

Carbide Digs Another 'Hole' For Itself !

'Another' hole? The first being Bhopal, which the company seems determined not to get out of. This is confirmed at London on May 10, 1988, when the company resorted to a 'cheap trick', by paying a consultant, Arthur D. Little, to tell the 'sabotage' story of Bhopal. The mass media loved it, but many a serious observer and even well wishers of Carbide wondered whether the company had overplayed their hand. Mike Hyde, highly respected in the chemical world, reporting in the late June issue of his CHEMICAL INSIGHT about the London conference (PREVENTING MAJOR CHEMICAL AND RELATED PROCESS ACCIDENTS, organised by the Institution of Chemical Engineers, their counterparts in USA and the World Bank), notes:

> . . . the disaster was man-made, which means it could have been prevented. Certainly such a hazardous process should not have been vulnerable to the crude form of 'sabotage' alleged . . .

The second 'hole' which Carbide seems to have dug for itself, is seen by some analysts to be as serious as Bhopal.

The Bhopal tragedy led to a drop in Carbide's stock price, and amidst the uncertainty and a poor image, there was a $4.8 billion hostile takeover bid by GAF Corp early 1985. As a defensive measure, there was a radical 'surgery' in Carbide's operations, selling off consumer products business and taking on a heavy debt ($3.2 billion) in order to buy back its own stock. Servicing of this debt has proved to be a burden far too heavy for the 'lean' but not necessarily efficient Carbide. Though the interest payment in 1987 was lower, compared to the previous year, by 30% to $380 million, it still exceeded the net profit by some $150 million. The debt to total capitalisation ratio dropped from 72% to 64% and 60% seemed within sight. Early 1 chairman and CEO Robert D Kennedy, desc the debt burden as 'manageable' and the ou was generally one of optimism. But within a weeks, the company was not so sure and plan recapitalising the company were announced. is sought to be brought down to 55% in ord improve the balance sheet. The intended dividend payout did not seem appropriate in light of high leverage. It has been nearly ha but is accompanied by a stock offering when if market conditions warrant in order to reduc debt by about $300 million. Financial streng sought to be improved so that the company 'cash in' on the best investment opportunities. sudden change in company policy has done c derable damage to company's credibility, alr none too high — thanks to Bhopal. Immedi after Bhopal, Carbide sought to reassure Wasl ton and its neighbours at the Institute plant could never happen here.' As if to ensure this safety system at Institute was upgraded in the of experience at Bhopal, and yet a 'mini-Bho did occur at Institute eight months after Bho This led to a credibility gap which has since wi ed considerably, thanks to the financial 'fiasco

Wall Street analysts doubt the wisdom of this den change and are also sceptical about fresh c tal expenditure to expand capacity in the light possible recession. With their present com ble liquidity and buoyant demand levels in mo its areas, the outlook seems optimistic, and 1 earnings may be double of previous year's figu $1.76 per share. But any downtrend could ca the company serious problems. And sudden p sure, legal or otherwise, to settle the Bhopal may add the 'last straw' to the sinking camel. can only wait and see !

tie-up with French firm to make liquid hydrogen

ian Oxygen Ltd. (IOL) and Air
ide of France have joined hands
manufacture of liquid hydrogen for
by the Indian Space Research Or-
sation (ISRO).

r. S. B. Budhiraja, Managing Di-
r of IOL said that a Rs. 15-crore
would be set up near Sriharikota
the purpose.

e said construction work on the
posed plant will start by mid-1989.
plant is likely to be operational in
90-91.

ncidentally, Air Liquide, one of the
ld's prominent manufacturers of li-
d hydrogen and other fuels for
ace programmes, had tied up in
88 with the Gujarat-based Dhranga-
ara Chemicals for transfer of techno-
gy. The tie-up was forged for bid-
g the contract.

Although ISRO had awarded the
nt contract to the Dhrangadhra-Air
uid combine in 1986, it was later
ncelled on a petition by IOL. IOL
d bid for the contract pairing with
r Products of the US.

As was evident, a twist was impar-
ed to the intense race for the project
hen both IOL and Dharangdhare swit-
hed collaborators midstream, settling
r Air Liquide and Air Products.

When a second tender was floated
OL bid for a second time and won the
ontract. A letter of intent was issued
arly this year.

As things stand now, the entire
lant for making liquid hydrogen would
come from Air Liquide. The new pro-
ject, which was figuring high on IOL's
st of priorities, would have a foreign
xchange component of Rs. 7 crores.

Mr. Budhiraja said the bulk of the
roject cost would be met by IOL
rough internal generation of funds.
esides, the Government-run financial
gencies would be approached for
nds. Air Liquide is also expected to
make available suppliers credit.

Once the plant is operational, IS-
RO's daily offtake would be around
500 kg a day, out of a total produc-
tion of 700 kg a day. At the moment
quid hydrogen has rather limited
commercial applications. In one way
IOL would much depend on ISRO for
marketing the new product. However, good demand is expected to be generated by the optic fibre industry in the coming years.

MOLASSES EXPORT TO REST WITH SUGAR INDUSTRY

The Department of Chemicals and Petrochemicals has decided to continue its policy of routing molasses exports through the sugar industry. This was conveyed at a meeting the department Secretary, Mr. H. K. Khan had with the representatives of the industry in New Delhi on August 9.

The sugar industry delegation which was led by Mr. Indu Bhai Patel, President of the National Federation of Co-operative Sugar Factories Ltd. said that in case the Government allowed any private party to export molasses, the industry would not co-operate in view of its sad experience with them on this issue.

The delegation pointed out that one and half months was too short a period to judge the performance of the industry on the molasses export front. During this brief period the delegation said the industry had made factory-wise allocations and tied-up shipping arrangements at three ports by now.

Against this promptness by the industry, the Government had taken as many as six months to decide on this issue. Now the movement of molasses from factories to ports was held up because the State Governments were not giving the necessary clearances in this regard.

The delegation expressed confidence that the industry would be able to build storage capacity at ports good enough to allow it to export one million tonnes of molasses in a year within the next three months.

It may be recalled that the department had allowed the industry to export four lakh tonnes of molasses on June 15 last through its export organisation — The Indian Sugar and General Industry Export Import Corporation Ltd.

Subsequently there was a proposal to put molasses exports on OGL following a plea to this effect by some private parties.

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No need for further import of DMT technology : DSIR

There is no need for any further import of technology for the production of di-methyl terephthalate (DMT) in the country according to a draft study made by the Department of Scientific and Industrial Research (DSIR).

The study has recommended that in-house development work should be continued to improve the efficiency and quality of DMT to reduce its cost of production.

The existing manufacturers of DMT may consider developing the process and facilities to make purified terephthalic acid (PTA) from their DMT plants so that they are able to meet the fluctuating demand of these two raw materials.

A co-ordinated effort by the existing three units, in which the resources are pooled and the costs shared, would accelerate this development, the study has suggested.

The study has been made by DSIR as part of its activities relating to the national register of foreign collaborations, which envisages review and analysis of imported technologies in the country and suggests measures for appropriate choice, acquisition and implementation of foreign know-how.

According to the study, if a viable process design for making PTA could be developed by the existing manufacturers of DMT, it would become possible for them to offer the technology for future PTA plants in India.

Considering the importance of this development, financial assistance as required should be provided and research and development programmes approved to accelerate the development.

While the bulk of the equipment in the existing plants was imported at the time of their setting up, the study says that in future projects this should not be necessary. Import of equipment that could be produced in India should not be allowed.

The study says that due to the development of production process for high purity fibre grade terephthalic acid, its share in polyester fibre production has been increasing steadily and, at present, accounts for over 50 per cent in the international market. In India, following the international trend, the production facility for PTA is being created and more new units are competing for it.

Any new capacity to be set up in India is likely to be for PTA rather than for DMT. There is, however, scope for carrying out improvements in the existing units.

All the development work relating to DMT is being carried out by IPCL, being the oldest unit in production. In terms of indigenisation of capital goods, IPCL has introduced technological improvement in DMT manufacture with the commissioning of a horizontal oxidator for the first time in the world.

Efforts are still being made to improve this. However, the national institutions and laboratories are yet to make any significant contribution in effecting improvement in DMT technology in the country, according to the report.

DMT, PTA PRICES HIKED STEEPLY

The government has raised the indicative prices of DMT and PTA, the major raw material for polyester industry. The DMT price has been revised upward from Rs. 21,000 per tonne to Rs. 23,500 and that for PTA has been raised from Rs. 23,650 to Rs. 26,500, it is learnt.

The Reliance Industries, the sole PTA producer in the country, has increased its selling price by Rs. 2,850 per tonne to Rs. 26,500 with immediate effect. RIL is expected to be producing around 1.25 tonnes of PTA annually.

The Indian Petrochemicals Corporation Limited (IPCL) and the Bongaigon Refineries, the two DMT producers in the country, have also raised their selling prices by Rs. 2,500 per tonne to Rs. 23,500 with immediate effect.

Bombay Dyeing, the largest DMT producer in the country, has not yet raised the price. The revised price is still highly uneconomic, when compared with the phenomenal increase in cost as a result of skyrocketing paraxylene price in the international market, aggravated further by recent increase in import duty in this vital raw material for DMT, a spokesman for the Bombay Dyeing said.

"What we are interested is ir
ting paraxylene at the same pr
other producers to place all on
same competitive level," the sp
man said.

BOMBAY DYEING SUSPENDS DMT SALES

Bombay Dyeing has suspended
of dimethyl terephthalate (DMT
polyester intermediate, following
Government's decision to raise it
dicative price by only Rs. 2,50
tonne.

Industry sources said Bombay
ing is unhappy with the quantum
price increase allowed. The com
is 100-per cent dependent on im
for paraxylene, the raw material,
has reportedly bargained for an inc
of Rs. 6,000 per tonne of DMT.

It sought to justify this deman
three counts: increase in CIF pric
paraxylene and in import duty anc
weakening of the rupee. However
Government is not convinced of
justification for such a steep incr
the sources said. Bombay Dyeing
nagement was not available for
ment.

RIL CLARIFICATION

Reliance Industries Ltd. (RIL) c
fied that it has already approached
Government to transfer its indus
licences for manufacture of PVC
HDPE and a letter of intent for
duction of MEG in favour of Reli
Petrochemicals Ltd. (RPL).

A company note said the Governr
endorsement on the industrial lic
in favour of RPL for the PVC pro
had already been received.

The clarification comes in the w
of a statement made in Parliment
the Industries Minister that no ind
trial licence had been issued to RP

The note said that RIL had in
promoted RPL for the implementa
of these projects. The RPL prospe
clearly stated that RIL, the promote
the company, had received indus
licences for the manufacture of
and HDPE at Hazira in Gujarat and
plication had been made for endo
ment of the industrial licences in
name of RPL.

RIL had also received a letter of
tent (as amended) for the manufac
of MEG at Patalganga in Mahara
tra and application had been made
the Government for extension of
[illegible]

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(Continued from p. 34)

urea and $ 70-80 per tonne for DAP and that too when India had stayed away from the international market in view of the continuous glut conditions on the domestic front. The trend may even get accentuated should India decide to give an advance indication of its intention to rely heavily on imports.

The apparent high cost of indigenous production and consequential subsidy burden should not be looked at in isolation. An objective analysis of the factors leading to higher cost would clearly show that much of the worry expressed on this account is unjustified. The capital costs tend to be high partly on account of the impact of the general phenomenon of inflation and "even more importantly certain decisions which are taken on considerations other than that of cost minimisation aspect alone." Actually the financial burden fertilizer imports entail is much higher than is generally indicated. Imports during 1986-87 were to the tune of 23.05 lakh tonnes valued at Rs. 650.28 crores but the figures are exclusive of raw material items such as rock phosphate and phosphoric acid which accounted for an additional 20.15 lakh tonnes. The projected imports (excluding raw materials) are 26, 26.90 and 31.75 lakh tonnes for 1987-88, 1988-89 and 1989-90, based on estimates of consumption and indigenous production. In terms of nitrogenous fertilizer, the figures will be roughly half, say, 16 lakh tonnes in 1989-90. The Varadarajan Committee has obviously taken the view that containing imports of nitrogenous fertilizers at even 35 lakh tonnes in 1994-95 should be considered an achievement because this would be possible only if indigenous production is substantially stepped up.

While efforts towards the achievement of self-sufficiency should be backed to the hilt, the basic realities cannot be ignored. The domestic demand inferred from projected consumption is estimated to rise from 103 lakh tonnes in 1987-88 to 113 lakh tonnes in 1988-89 and 123 lakh tonnes in 1989-90; the corresponding indigenous production estimates are 77, 83.40 and 91.25 lakh tonnes. The yawning gap would not presented itself had the record in the co sioning of the new fertiliser plants been br than it has been. As things are moving t the country should consider itself lucky i three gas-based projects at Sawai Madh Babrala and Shajehanpur could go on strea the end of 1990 and mid-1991 instead of in 1988, January 1989 and July 1989 as wa lier planned. These are the kind of slip that increase the already heavy dependen imports. The heartbreaks implicit in pla fertilizer imports are well known. Both tiful and deficient monsoons could have the jections going haywire. The one results big increase in demand which would have fied a higher import, while the other could to drastically reduced offtake and then on situation of glut. It is this difficult tas managing availability, both indigenous an ported, in recurring situations of the glu scarcity that prevents the Government venturing into setting any specific targ achieving self-sufficiency. That it has s for a policy of having a judicious mix o options — indigenous production and im — is hardly surprising.

The Government is hesistant when it c to the question of making firm commit with respect to investments on new fert project and justificably so, even if the obj is the desirable one of achieving self-suf cy in capacity during the Eight Plan, be the cost of investment in India per ton nitrogen will be much higher than Rs 1 recorded in 1986-87, according to an est made by the FAI itself. This is indeed boggling for a country living with a res crunch. It should, however, still be po for the fertiliser industry to fare a lot bet its capacity utilisation was quite high at per cent in nitrogen plants and 84.1 per c phosphate plants. There is no reason why a performance should not be repeated o proved upon in the years to come.

— T P S R

MERS IMPORT:

World bank agrees to provide aid

World Bank has agreed to as-
dia in financing polymer imports,
provide about Rs. 128 crores
eign exchange for import of dif-
types of polymers this year.

ese funds will be available, offi-
sources say, mainly for polymers
e produced by the Maharashtra
Cracker Complex (MGCC). These
ude high density polyethylene (HD-
low density polyethylene (LDPE),
ar low density polyethylene (LLD-
and polypropylene.

The bank is already giving sizeable
ds for the implementation of the
CC which is expected to be com-
sioned by 1990. The fresh loan for
ports will be given as part of a mar-
seeding programme for MGCC.

The World Bank assistance is parti-
larly welcome since the total import
ll for polymer imports this year may
uch Rs. 400 crores.

The huge imports have become ne-
essary because of a sudden spurt in
emand for plastic products in the
untry. The government, which was
tially caught unawares, rushed seve-
al delegations abroad to tie up import
contracts. But, even with sustained efforts, it has not been possible to meet the entire demand.

According to official estimates, demand for various polymers is about 6,50,000 to 7,00,000 tonnes this year, while domestic production is only 3,50,000 tonnes. About 2,70,000 tonnes of imports have been tied up by the industry ministry, but this will still leave an unfilled gap of 30,000 to 80,000 tonnes. In addition, import contracts have been finalised for another 3,40,000 tonnes of polymers which will be needed from April to December this year.

Subsequently, it is expected that with the commissioning of the MGCC, the availability position will ease considerably in the country.

Till then, however, the country will find it difficult to meet the full demand since availability of polymers is getting tight even in the international market. Demand has been rising at a higher pace than usual in Western Europe, US and Japan, while there has been no matching rise in the production capacities. Besides, accidents in some ethylene plants have led to a further shortage in ethylene supply. But, there is likely to be significant growth in setting up capacities in South-East Asian countries.

In any case, polymer prices are rising steeply and the country's import bill may ultimately be much higher than is currently anticipated. Even for contracts already finalised, cost escalation clauses envisage nearly 50 per cent price increases in the future. For instance, for mono-ethylene glycol, imports are currently at $1,200 per tonne, but one contract specifies that the price will go up to $1,700 at a later date.

Of the 2,70,000 tonnes of polymers being imported this year, LDPE and LLDPE account for 78,000 tonnes, HDPE for 63,000 tonnes, PP for 35,000 tonnes, PVC for 100,000 tonnes and polystyrene for 6,000 tonnes.

Major supplies of LDPE and LLDPE will be from Saudi Arabia, Qatar and Yugoslavia. HDPE will be imported from Western Europe and Japan, while polypropylene is being purchased from South-East Asian countries. PVC is coming mainly from South Korea, but some small quantity is being imported from Brazil.

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Tetra N-Butyl Ammonium Bromide

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Inputs at global prices to revive HDPE sack units

The Government has agreed in principle to provide raw materials at international prices to enable the plastic woven sack industry to work out its salvation in the export market.

Several other measures are being planned to revive the industry which has been in the dumps ever since the promulgation of the Jute Packaging Materials Act (JPMA) last year. The Act, in utter disregard of the user industries' wishes, exiled the synthetics industry from its best markets within the country and reserved them for jute.

Other likely sops include enhancement of the cash compensatory support, which is now paid at the rate of five per cent of f.o.b. value. The Plastics and Linoleum Export Promotion Council (Plexconcil) is now collecting data for grant of additional assistance to exporters for market and product development.

Officials are also favourably considering the industry's request to reduce the value addition criteria from 33 per cent to 25 per cent in view of the steep increase in raw material prices. The input-output norms of the industry are now fixed on a case-to-case basis. The industry has been demanding fixation of norms on all-industry basis. Indications are that this may also be granted.

Though the industry made its first foray into export market in the early 1970s, it had to beat a hasty retreat because of stiff competition from China, Taiwan and South Korea which continue to dominate the scene. The current interest in exports among Indian producers is entirely due to JPMA. The total global woven sack market is estimated $2 billion.

Some half-a-dozen units have now taken to exports and except one, all of them are making losses. The leading exporter, who accounted for more than Rs. 2 crores out of the industry's combined exports of Rs. 4.91 crores last year, is Mr. Niranjan Gandhi, Gujarat Polyweave, Ahmedabad. Mr. Gandhi manages the only 100-per cent export unit in the country. His unit has been making profit only because of the advantages available to a cent per cent export unit.

Indian bags are of international quality but suffer from higher price. While Indian price ranges from $2,100 to $2,300 per tonne, China quotes as low as $1,900, thanks to the cheaper raw material prices it commands by virtue of its long-term contracts with world polymer exporters.

China manages to wrest the best prices as it is one of the biggest customers in the world plastic market. However, the scenario has been changing of late and China is now quoting almost the same price as India's, according to an industry source in
bay.

The appreciation of yen has h
Indian exports. Another plus fac
the superior quality of the Indian
ducts compared to the Chinese.
is because the Indian industry has
dern circular looms unlike the Chi
who are saddled with older equipr

The Plexconcil has projected a
get of Rs 10 crores for woven s
this year. Last year, the industry
ported 2,000 tonnes valued at al
Rs. 5 crores. This year's exports
expected to touch 5000 tonnes. "I
Government accepts our demands,
pecially that of raw materials at i
national prices, we could e
10,000 tonnes this year itself,' an
porter said. Exports could easily
lifted to Rs. 100 crores in a few y
if adequate support is given, he

Will the proposed incentives at
more units to export and help re
this sick industry? This seems unli
at least in the near future. Some
units have been closed because
JPMA and the remaining are run
at 25 to 50 per cent capacities.
bankers are at the doors of the su
ing units for repayment of loans.
ancial institutions have said that
new unit can expect assistance.

Considering the plight of the ind
try, the Industrial Development B
of India (IDBI) has instructed bank
help sick units.

Accordingly, the member units m
if they so wish, approach the prim
lending institutions for need-based
lief-assistance for rehabilitation."

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US Co.s' bid to curb Indian drug exports

ia's growing penetration of the generic drug market has aroused atment among the American manufurers, some of whom have approa- the administration asking for reation of duty-free status for Indian orts.

he demand, coinciding with the US ernment's pressure on India to sign Paris convention on patents, has used fears that the most lucrative ort market may become out-ofnds for the Indian industry.

Ethyl Corporation, a bulk drug and mical unit based in Richmond, Virnia, has filed a petition with the US ade Representative, Mr. Clayton utter, asking for revocation of dutyee status for Ibuprofen.

The company has justified its deand with the claim that "the flood Indian Ibuprofen into the US market undercutting the price of US producon." Some other manufacturers have lso complained of dumping by Indian ompanies.

Ethyl Corporation in its petition has aid, "we believe Ibuprofen industry n India, perhaps the whole pharmaceucal industry, is as developed and as ompetitive worldwide as is the indusry in the US or any other country here Ibuprofen is produced.

This claim may be true, but chares of dumping by Indian firms are unir, according to the industry sources n Bombay. They said India is quoting he same price for Ibuprofen in the US s it did in Europe, and no European manufacturer has complained as yet. f the drug costs more for American manufacturers, Indian suppliers ought not to be blamed, they said.

Cheminor Drugs Pvt Ltd, a Hyderabad-based company belonging to Dr. Reddy's Group of companies, is the largest producer of Ibuprofen in India and has obtained the approval of the US Food and Drug Administration (FDA) of the US. It began its production of the drug in 1985 and produced 212 tonnes last year. More than 80 per cent of the drug is exported to the US, the USSR, Japan, China, UK and other countries. Exports of Ibuprofen has earned more than Rs. 25 crores for the company.

Industry sources said that the most attractive market for the industry is the generic market in Europe and the US and a host of Indian companies have turned to export of those bulk drugs and formulations whose international patents have either expired or are about to expire in the near future.

India has already earned a name in the world market as a leader in the manufacture of a number of bulk drugs like Ethambutol, Metramidazole, Methyldopa, Ibuprofen, Mebendazole and Sulfaxmethaxole. Drugs whose patents have already expired in the US and produced in India include Chlorpropamide, Lorazepam, Methyldopa, Tolnaftate, Danazol, Diazepam, Ibuprofen, Clonidine, Metaproternol, Ampicillin, Cephalexin, Sulfamethoxazole and Trimethoprim.

This year, patents for two other drugs produced in India, Nalidixic acid and Piroxicam are expiring. Other drugs whose patents are expiring in the near future include the following already made in India: Albuterol, Amoxicillin, Miconazole, Nifedipine, Naplol, Cimetidine, Terbutaline, Captopril and Cisplatin.

Last year, out of the $ 30 billion US pharma market, generic drugs constituted $ 4 billion. It is estimated that this segment will grow to $ 11 billion by 1998. This represents perhaps the biggest marketing opportunity for the Indian industry.

The most important factor which enabled India to penetrate the US market was the enactment of the India Patents and Design Act of 1970.

UNICHEM PACT WITH SOVIET FIRM

Bombay's Unichem in collaboration with the Soviet firm Mediexport have agreed to establish a joint venture in Chimkent in Soviet Kazakhistan for manufacturing buprenorphine and maxigan, pain-killing medicines, according to a press release.

Managing director of Unichem Mr. A. V. Modi said that 80 per cent of the medicines that USSR imports from Europe and the USA were also manufactured in India under licenses.

The Indo-Soviet co-operation in this field, he said, opened a vast Soviet market for India and the Soviet Union would be saving valuable foreign exchange, the release added.

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Panel to study drug margins

The department of chemicals and petrochemicals may entrust a committee headed by Prof I.Z. Bhatty, director-general of the National Council of Applied Economic Research to find out the economics of trading in pharmaceuticals and make necessary recommendations, it is learnt.

A notification to this effect is expected to be issued by the department in a day or two. The government may also ask the pharmaceuticals trade to withdraw its ongoing stir against the drug industry.

The decision to entrust NCAER the task of determining the costs of trading and make suitable proposals is taken as the Kelkar committee refused to take up this issue once again.

The Kelkar committee had taken up the issue of trade margins last year in the context of opposition to steep hikes in the trade margins proposed in the New Drug Price Control Order 1987.

An agreement was thus reached with the industry and trade with the initiative of Dr. Kelkar in December last. The agreement was not however implemented by the government. On the other hand a notification was issued in March last by the department which was totally different from what was agreed upon in December last.

Informed sources said that the new committee headed by Prof. Bhatty may not have any representatives from the industry or trade but will have a few independent cost accountants.

It is likely that the department may ask the trade to accept the retail trade margins of 16 per cent as notified in March last and the wholesalers whatever they are currently getting. There is no uniformity in the wholesaler's margin at present.

The pharmaceutical trade has been demanding a margin of 16 per cent inclusive of excise duty for retailers and eight per cent for wholesalers. The drugs industry has taken a stand that granting 16 per cent of maximum retail price inclusive of excise would mean an actual margin outgo of 18.5 per cent. This would be unbearable to most of the drug units.

SODIUM METAL SHORTAGE HITS BULK DRUG OUTPUT

Shortage of sodium metal has affected the production and export prospects of sulphamethoxazole and trimethoprim, two anti-bacterial bulk drugs.

Apart from its use as an intermediate in the manufacture of these two drugs, sodium metal is also used as a heat transfer medium in atomic reactors.

For the manufacture of the two bulk drugs alone, the industry requires around 950 tonnes every year. However, the domestic availability is inadequate. There are only two units producing sodium metal — Sodium Metal Pvt. Ltd. of Baroda and Alkali Metal Pvt. Ltd. of Hyderabad. The to
stalled capacity of 24
latter 360 TPA.

Unfortunately,
of both these units has
The Baroda unit produ
TPA and the Hyderaba
75 TPA against the in
of around 1,000 tonne

Manufacturers of the
would like the Governm
dium metal from the li
ble list to the OGL lis
only help the domestic
pharmaceutical industry
exports.

IDMA CHIEF ACCEPTS RESIGNATIONS

The Indian Drug Ma
sociation President Mr
Shah, accepted the res
mitted by five office-be
sociation.

He said he had kept
pending in the hope the
withdrawn, and the iss
amicably resolved. Ho
of the proposed illegal
mittee meeting on Aug
no alternative but to a
nations with immediate

An IDMA member s
Vice-President, Mr. Ma
call for an emergency
committee is illegal, ac
acceptance of the resig
as per the IDMA const
tions can be accepted
neral body or the chari

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S IN BRIEF

NCENTIVES TO

to Prime Minister Rajiv est Bengal chief minister, su, has criticised the re- decision to reduce impor E granules and lower ex- production of HDPE bags

er, the chief minister said and concessions to the anufacturers will seriously ute industry in the eastern ell as lakhs of cultivators.

ntext, he pointed out that o withdraw the statutory minimum support prices had already made the jute rehensive about the returns ting to receive. "Since the eason is expected to be Mr. Basu urged the Prime to take any decision which ely affect the jute industry.

IN CHEM. EXPORT

f chemicals are estimated oped by 50 per cent in the period of 1988 to Rs es compared to Rs. 211 he same period of 1987.

m confirming the continua- growth in chemical exports years, these figures also re- ergence of chemicals as one st growing export sectors traditional area.

er exports from the chemi- reached a level of Rs. crores, exceeding the target 200 crores and representing of 38 per cent over the per- in 1986-87.

t encouraged the Govern- at a target for exports of goods during 1988-89 [illegible] crores, aiming at a growth cent.

[illegible]

termediates, bulk drugs and pharmaceuticals, medicinal castor oil, agro-chemicals including organic and inorganic chemicals, paints and varnishes, processed minerals and rubber footwear.

Of the total exports of Rs. 1,265.1 crores in 1987-88, the shares of Basic Chemicals, Pharmaceuticals and Cosmetic Export Promotion Council (Chemexcil), Chemicals and Allied Products Export Promotion Council (Capexil) and Plastic and Linoleums Export Promotion Council (Plexconcil) were Rs. 733 crores, Rs. 433 crores and Rs. 84 crores, respectively.

During April-June 1988 Chemexcil's exports at Rs. 180 crores and those of Capexil at Rs. 125.4 crores were higher than their performance in the same period of 1987 at Rs. 114.05 crores and Rs. 91.7 crores, respectively. Even in regard to plastic goods, exports in this period went up to Rs. 16 crores from Rs. 6 crores.

IRON OXIDE PELLETS EXPORTED TO U.S.

The country's first shipment of iron oxide pellets valued at Rs. two crores to the American continent was despatched from New Mangalore Port, says a press release issued by the Kudremukh Iron Ore Company Ltd. (KIOCL).

KIOCL has also obtained its first order for the export of iron oxide pellets from the Federal Republic of Germany (FRG). A consignment valued at about Rs. 2 crores is to be shipped to the Dillinger Steel Mills later this month.

With these two major orders, KIOCL pellets are now being exported to 12 countries. The new markets added during the current year are Qatar, North Korea, Malaysia, the USA and the FRG.

The press release notes that KIOCL hopes to increase its exports during 1988-89 to over Rs. 100 crores.

IPCL HIKES MEG PRICE BY RS. 1,100

[illegible]

NOCIL, the only other MEG producer in the country, is soon expected to follow suit. The last price rise by these indigenous producers was in the beginning of the current year.

The IPCL has raised MEG selling price from Rs. 17,400 per tonne ex-factory to Rs. 18,500.

MEG is one of the major inputs for the manufacture of polyester. With the increased demand within the country of PVC, HDPE etc., which are ethylene-based products, MEG availability from indigenous sources has come down by more than 50 per cent from an average annual supply of around 22,000 tonnes from these two plants.

The country thus depends on imported MEG to the extent of about 90 per cent and its price in the international markets has sky-rocketed from US $350 per tonne in 1986-87 to over $1,800 at present. Even at this high price, its availability in the international markets is extremely erratic.

RAMA PETROCHEM TO DOUBLE CAPACITY

Rama Petrochemicals Ltd. has decided to double its methanol capacity to one lakh tonnes.

The increase in capacity is expected to cost around Rs. 40 crores. The company expects to finance the expansion by internal accruals (about Rs. 12 crores), loans from financial institutions and a rights issue.

The company has already initiated discussions with Lurgi GmbH, its West German technical collaborator and other parties for its expansion project. The Government, it may be noted, has fixed the minimum economic capacity at one lakh tonnes.

Rama's expansion, coupled with the new projects planned by a number of parties, is expected to meet the entire requirement of this basic chemical which only a year ago was imported by the State Trading Corporation.

EXCISE DUTY ON FORMALDEHYDE REVISED

The Central Excise Collectorate, Bombay, has issued a notification [illegible]

FERTILISER NEWS

Namrup-III—testimony to PDIL's expertise

A two-day workshop on Namrup-III was organised by Projects and Development India Limited, Sindri on July 14-15, 1988 at Sindri. The main theme of the workshop was "Sharing of Experience from the Execution of Namrup-III Project". The workshop was meant to provide a forum for the Consultant (PDIL), owner (HFCL) and suppliers of the critical equipment to share their experience in executing the project with a view to identify the potential areas of improvement so as to formulate suitable strategies to achieve better efficiency in execution of future projects. About 100 experts from all over the country participated in the deliberations. The workshop was inaugurated on July 14, 1988 by Sri K. S. Sarma, Ex-Chairman and Managing Director of PDIL. Sri Sarma is an eminent fertilizer expert of the country. Sri V.R. Joharapurkar, Chairman & Managing Director, PDIL welcomed the guests and delegates.

Inaugurating the workshop, Mr. K. S. Sarma first traced back the history of development of PDIL which was conceived in 1955 as the technology department of FCI, Sindri, as an indigenous technological base capable of meeting the growing requirements of design and execution of fertilizer plants. On successful completion of the expansion of ammonium sulphate plant at Sindri and execution of certain balancing schemes for debottlenecking the original Sindri plant, the company undertook the design, engineering, construction and commissioning of large nitric acid and CAN complex for the Rourkela Steel Plant which were constructed with limited foreign assistance. Subsequently, PDIL has undertaketn the design and construction of several large fertilizer units of the country which were successfully implemented.

While there had been delays in timely execution of some of the projects inviting criticism, Mr. Sarma pointed out, there had also been a much larger number of projects successfully implemented within the time schedule and cost but unfortunately this success has not been sufficiently acknowledged. Even for the projects falling under the category of not so successfully implemented, the reasons could be traced to uncertainties and delays in the matter of providing adequate finance, clearance and other timely assistance for import of equipment and raw material of required quality. He further added that one of the invisible gains of indigenous engineering and technology had, in fact, been the development of industries in India for manufacturing such equipment.

Mr. Sarma was of the opinion that with the availability of our own knowhow for engineering and project management, besides cutting down of the cost of imported content in the plant, the need for external assistance, if at all required, has been reduced to minimal and is available readily on competitive terms from established firms who were earlier not willing to offer the same.

Concluding his speech, Mr. Sarma said that the forum would certainly act as a catalyst for effective and meaningful interaction amongst the well-known experts in fertilizer industry and participating delegates.

The workshop on Namrup-III project was divided into four technical sessions spanning over two days. In the technical sessions, a number of papers were read by several eminent experts covering the entire gamut of Project Execution including its profile, implementation and performance. In his speech, Mr. D. Saikia, Chief Resident Executive of the Namrup-III Project appreciated the effort of PDIL in successful accomplishment of the project. The valedictory session was chaired by Mr. V.R. Joharapurkar, Chairman & Managing Director, PDIL. Mr. Joharapurkar mentioned that the deliberations of the workshop would immensely be-

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the improvement and consolidation of the pioneering work done by PDIL.

At the end, Mr. K.C. Mehrotra, General Project Manager, PDIL proposed a hearty vote of thanks.

Projects & Development India Limited, a premier design, engineering and consultancy organisation of India, has opened a new era in Indian fertilizer technology by successfully implementing the Namrup-III Fertilizer Plant owned by the Hindustan Fertilizer Corporation Ltd., located in upper Assam in the district of Dibrugarh. This was a massive project assigned to PDIL on turnkey basis right from the grass root level upto commissioning and guarantee test for production of 600 TPD of ammonia and 1167 TPD of urea based on natural gas as the main feedstock. The plants which have achieved their full rated capacity production bear a silent testimony to the engineering excellence of PDIL.

In the Namrup-III project, more than 60% of the equipment are indigenous, saving a lot of foreign exchange on this account. A special feature of Namrup-III is that almost all the catalysts, except Ammonia Synthesis, charged in the plant have been developed, manufactured and supplied indigenously by PDIL, and are consistently giving a satisfactory performance.

It is a matter of great satisfaction that PDIL backed up by its highly professional task force and engineering excellence, has proved its worth in building such plants with its own in-house technology, thus achieving a new milestone in pursuit of self-reliance in Indian fertilizer industry. The plant has a capacity to produce 3,85,110 tonnes of urea annually which in turn would make an annual gross saving in foreign exchange to the tune of about Rs. 60 crores.

HALDIA FERT. COMPLEX : CALL TO EXPEDITE FACE-LIFT PLAN

The Bengal National Chamber of Commerce and Industry (BNCCI) has expressed concern over the Union Government's decision not to go ahead with the rehabilitation scheme for the Haldia fertiliser complex and the expansion of the Haldia refinery of Indian Oil Corporation (IOC).

In a letter addressed to the Union Minister of State for Fertilisers, Mr. R. Prabhu, the BNCCI President, Mr. Subimol Ghosh, said that if the rehabilitation scheme for Haldia fertiliser complex was not implemented on the basis of the recommendations of the foreign Consultancy firms, Toyo Engineering Company, Japan and Uhde, West Germany, the Rs. 501 crores already spent on the project would be wasted. In an another letter to the Union Minister of State for Petroleum, Mr. Brahm Dutt, the President said that Government's decision not to implement the Haldia refinery on the ground that the cost would be equal to setting up a altogether new unit in the eastern region did not stand up to scrutiny.

Apart from the fact that the refinery had all the facilities of catering to the whole of the north eastern region, the unit had registered a gross profit of Rs. 54 crores during the last year and its annual production capacity of 2.5 million tonnes had been consistently exceeded in the last few years.

According to the Chamber, the setback to these two projects would not only retard the economic growth of the State but the flow of Central funds to the State would also dwindle.

Under the circumstances, the Central public sector investment in the State would continue to be smaller compared to other States. The growth rate of Central investments in West Bengal in 1985-86 was 19.32 per cent as against 35.4 per cent in Gujarat, 29.98 per cent in Uttar Pradesh and 22.83 per cent in Haryana, Mr. Ghosh said.

IPCL EXPORTS METHYL ACRYLATE

The Indian Petrochemicals Corporation (IPCL) has made a major breakthrough in foreign markets by exporting 54 metric tonnes of methyl acrylate to Poland, an IPCL spokesman said recently.

The methyl acrylate has been shipped to a Polish firm named Ciech, the IPCL official said.

The export consignment, though worth only Rs. 21.6 lakhs, is considered a breakthrough since it would in all probably increase the demand for IPCL products, he added.

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Changes in fertiliser policy urged

The Government should modify its fertiliser policy in such a way as to strengthen the existing units even while going in for gas-based projects.

In south specially, all the fertiliser units are more than 15-years-old which need to be modernised to reinforce the industry's base. An expansion in the production capacity of these units is vital considering that the investment in gas-based projects will be huge, necessitating granting of higher subsidy, according to spokesmen of the industry in the region.

Mr. K. P. Surendranath, Managing Director, Mangalore Chemicals and Fertilisers Ltd. and in-coming Chairman of the Fertiliser Association of India (FAI), Southern region, said that a degree of flexibility could be built into these plants for use of new feedstocks.

However, as and when gas availability from the Krishna-Godavari Basin is stabilised, the industry in the south will press its claim for new gas-based plants, he added.

Referring to the fertiliser scenario in the southern region, he said significant increases in both nitrogen and phosphate capacities amounting to 54,000 tonnes and 1,38,000 tonnes, respectively, were recorded last year. However, production was lower compared to the previous year — nitrogen by 0.3 million tonnes and phosphates by 75,000 tonnes.

Production was affected in FCI, MFL and MCF plants for various reasons like equipment breakdown, power cuts, shortage of water, labour unrest and delayed arrivals of imported phosphoric acid.

On the consumption front, the region registered a marginal growth of 6.1 per cent over the preceding year despite adverse climatic conditions. The highest growth of 19.3 per cent was recorded by Kerala followed by Tamil Nadu (10 per cent) and Andhra Pradesh (7.2 per cent). Consumption fell by 1.3 per cent in Karnataka and by 1.5 per cent in Pondicherry.

The growth in consumption has been attributed to changes in cropping patterns coupled with the incentives provided by the State Governments [illegible] [illegible] interior areas and promotional efforts and advisory services provided by the Governments and the industry.

The industry's hardships due to excess availability of fertilisers in the market was also mitigated to a great extent during the year in the wake of the Government decision to limit import as also to keep the imported fertiliser as a buffer.

The prospects for the industry in the current year is bright following good monsoon rains and it is expected that the nearly 2.2 million tonnes inventories with the manufacturers could be brought down to manageable levels by April 1, 1989.

Production is also projected to pick up in view of improved working conditions in the plants like better availability of power. Phosphates production is forecast to improve with supply of phosphoric acid having stabilised.

ASSOCHAM SUGGESTS NEW SCHEME TO BOOST EXPORTS

An entirely new concept to promote exports in thrust areas has been recommended by the Associated Chambers of Commerce and Industry (Assocham).

Called thrust area international trade approach for rapid advance companies — Tiara — the scheme aims at providing special support to export winners for boosting the country's exports.

Assocham has suggested that Tiara companies should have financial and operational flexibility such as economies of scale and choices of technology that are internationally appropriate to enable them compete on an equal footing with successful OECD companies.

The chamber has further recommended that Tiara companies should be exempted from some sections of FERA for operational flexibility. The changes suggested refer to the suitable amendment of Sections 2, 8, 9, 14, 16 and 18 of FERA.

It has also suggested that Tiara companies be permitted to own, acquire and collaborate with local companies [illegible]

including the acquisition of
and serving companies ab
companies should also have
dom to take on foreign na
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and local managers, the ch
suggested. These changes c
ught about by suitable ame
Sections 25,26,27 and 30 o
has said.

Further, the scheme pro
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each year equal to 20 per c
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However, the chamber has
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buting less than five per c
nation's exports in the ident
area and (c) slump in expo
Rs. 10 crores for two years.

PPCL TO START PRODUCT SOON

The single super phosph
Pyrites Phosphates and Che
(PPCL) is likely to go into
by the end of the current m
ahead of the schedule.

The optimism is based o
that over 75 per cent work
pleted by the end of July a
the projection of 60 per cen

The unit will produce 6
of single super phosphate
day which will be sold in
name, Sona Ganga.

The Rs. 63-crore fertilise
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pyrite is available.

The Central undertakings
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DMA against changes in patent act

an Drug Manufacturers As-
as expressed alarm over the
mounted on the Government
Government to compel India
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IA expressed its fears that
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mean deathknell to the na-
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iving low-priced medicines."
the prices of drugs and me-
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of import of essential and
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rs removal of all competitive
m the market, IDMA said.
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bulk raw material in the co-
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consumer on the other. As
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invited the Government's at-
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the purpose.

Government can ill-afford at
to disturb the price structure
operating within the country
titive environment and take
of creating a monopoly situa-
imported patented drugs by
ionals."

[illegible] pointed out the [illegible]

[illegible]

because of the monopoly of imports allowed to multinationals, (2) indigenous development of technology by the national sector will deteriorate; (3) there will be an increase in the imports of costly substitutes and the value of such imports would go up considerably in less than five years; (4) the export effort mounted by national companies for bulk drugs and pharmaceuticals will receive a severe setback and this will be matched by increased imports.

The letter pointed out that the industry today has reached a situation where the gap between export and import is minimum and it has not increased over the last 10 years. On the contrary, it is showing a declining trend. The gap between import and export will widen if India signs the convention.

Many of the new discoveries of the world have been introduced in India in three-four years' time after the enactment of the 1970 Act. The pre-1970 gap for introduction of new drugs was on an average, eight to 10 years. The Indian consumer will be denied the availability of new drugs fast enough after its introduction in the western world at a reasonable price if India succumbs to pressure, IDMA said.

Also CSIR and other research institutes are on record that the Indian Patent Act has in fact stimulated indigenous research and development and have in fact contributed to technological upgradations and innovations during the last 18 years.

This has also been recognised in recent years by various ministries and special committees appointed to study the need for joining the Paris convention. Five committees have unanimously recommended that India should not join the Paris convention, and that there is no need to amend the Indian Patents Act of 1970.

These are: National Drug Development Council 1986, a high-powered official committee appointed by Mr N. D. Tiwari, the then Minister of Industries, a committee appointed by the Prime Minister under the chairmanship of Dr. Ganguly of IPCL, the Kelkar Committee on new drug policy in 1987 and Dr. Laha's Committee in 1988.

IDMA also highlighted the Government's stance at the Venezuela GATT meeting where it resisted the introduction and imposition of services including intellectual property rights in the GATT system.

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Coping with climate change

The greenhouse effect, once a subject of purely scientific inquiry, is rapidly emerging as an important public policy issue. The U.S. Congress reportedly devoted more time in 1987 to hearings on climate issues than it did to acid rain.

Although many uncertainties remain about the greenhouse effect, scientists are largely in agreement on the broad outlines. The concentration of heat-trapping greenhouse gases in the atmosphere is steadily increasing as a result of man's activities. The most important gases are carbon dioxide (CO_2), responsible for about half of the effect, and methane (CH_4), nitrous oxide (N_2O), chlorofluorocarbons (CFCs), and tropospheric (lower atmosphere) ozone (O_3), which are expected to have a combined effect equal to that of CO_2.

Computer models predict that a buildup of greenhouse gases in the atmosphere equivalent in heat-trapping capability to a doubling of the preindustrial level of CO_2 will commit the earth to a rise in temperature of 1.5 to 4.5°C. Because of lags in the earth, air, and ocean cycles, global temperatures may take some time to reach a new, higher equilibrium level. But once the gases are emitted to the atmosphere, the effects may be inevitable, according to current models. And the effective doubling of atmospheric CO_2 is expected within 50 to 100 years.

Many scientists would agree that because of uncertainties about key feedback mechanisms, which could exacerbate or dampen the warming, the actual changes may fall above or below the range of predictions now being made. Nobody knows for sure. But even the low end of the prevailing estimates — a 1.5°C warming — would create the warmest conditions experienced in recorded history.

All time warm high

A 4.5°C rise would create a temperature regime last experienced in the Mesozoic era — the age of dinosaurs. The mercury would not necessarily stop there, either. Gas concentrations above a CO_2 doubling could yield even greater warming.

Some researchers believe that greenhouse gas emissions to date have already committed the earth to a warming of 0.5 to 1.5°C. Recent analysis of temperature records over the past century reveal an overall warming of about 0.5°C, with the three hottest years occurring in the Eighties and five of the nine warmest since 1978.

The Environmental Protection Agency is carrying out a major assessment of the potential effects of climate on forests, lakes, wetlands, agriculture, human health, and other aspects of the environment. The project also will identify policy options for adaptation to such changes and will flag key areas of scientific uncertainty.

In many cases the uncertainty about regional climate changes will prevent researchers from drawing firm conclusions about the effects on a given resource. For instance, without knowing whether rainfall and soil moisture will increase or decrease in a given area during the growing season it is difficult to predict the impact on crop yields.

Rise in sea levels

These kinds of "what if" studies are useful for understanding what might be at stake if climate does change and how adaptive responses might work. Coastal development planning, for instance, should consider the possibility that a greenhouse-induced warming may raise the sea level a few inches to a few feet in the coming decades. According to Stephen Leatherman, director of the Laboratory for Coastal Research at the University of Maryland, the earth's oceans have risen about six inches during the past century. As a consequence, 90 per cent of U.S. beaches are eroding at a national average rate of slightly more than one foot per year, and many areas along the Atlantic and Gulf coasts are eroding three to five feet a year.

Rising seas and other results of a global warming could have implications for utilities as well in areas ranging from plant siting to load profiles and the availability of hydro resources. EPRI (Electric Power Research Institute) recently cofunded a study on possible impacts of climate change on utility operations. Although costly to individual utilities, the study found that the costs could be significantly reduced with appropriate planning.

Because the sources of gr
gases are so diverse, any
amelioration of global warming
quire action by many nations.
of reaching international agree
mitigation strategies could be
ed, however, by the perception
part of some countries that th
be better off in a warmer worl

Climate models predict, for
that rainfall over the midd
might shift northward, improvin
ing conditions in Siberia and
but recreating the Dus
in the American plains.
rainfall would probably increa
ming nations in the path of n
vere tropical storms but poss
ping arid regions like sub-Sah
rica.

Most nations — especially
geographically diverse ones li
U.S., USSR and China — wo
bably receive some mix of ben
costs. For instance, a welco
ming in Siberia might be acco
by less desirable changes in
tern Soviet Union

Although some nations may
they stand to gain, none can k
sure. They know some chang
ly, but they do not know how
will arrive, how severe it wil
how it will manifest itself
Moreover, many of the most
effects may yet be unanticipat
mate change may proceed
and almost imperceptibly.

It will be difficult to achiev
national co-operation to mitiga
mate change. But it may be
achieve in todays state of sh
certainty about local and reg
fects than it would be if nat
(or thought they knew) who
ners and losers would be.

How to slow the change

Many of the major policy
have already been articulated,
centre on slowing the buildup
trapping gases in the atmosph
cifically, the key options app
reducing emissions of CFCs,
and reversing tropical deforest
limiting combustion of fossil

Proponents point to the
accords of last September, in
negotiators from 49 nations a
restrictions for CFCs as an
example of how nations ca

e principal impetus was con-
CFCs are depleting the stra-
; ozone layer that shields the
om harmful solar ultraviolet
. But CFCs also act as green-
ases in the lower atmosphere.
e Montreal agreement is ratified
east 11 nations representing
ds of global CFC production,
also help ameliorate a green-
warming.

factors made agreement on CF-
er than might be the case with
greenhouse gases. The negotia-
erceived a clear and present dan-
th regard to ozone depletion (hi-
ss of skin cancer and cataracts),
CFCs are used for specific com-
l purposes (like refrigeration and
ction of insulating foams) for
substitute compounds exist or
cer development. In other words,
ts's to society of reducing CFC
are not very high.

w findings that ozone levels are
g worldwide — not just over
ctica, as had been previously
ht — have some scientists and
y analysts calling for even stricter
ols or an outright ban on CFCs.
thers feel that the link between
s and the five per cent worldwide
e decline from 1979 to 1986 is
clear because ozone levels are
ght to rise and fall in natural cy-
perhaps associated with changes
olar activity.

GREENHOUSE POLICIES EMERGE

Although scientific understanding of man's impact on climate is incomplete and there is not much precedent for multilateral agreements on environmental issues, domestic laws and international pacts related to climate change are beginning to emerge and the pace of discussion is building.

Global Climate Protection Act of 1987: Passed by the U.S. Congress last December, this law requires EPA to develop a coordinated national policy on climate change and charges the State Department to seek international cooperation in limiting such change.

Montreal protocol on the ozone layer: An international agreement approved by representatives of 49 nations last September to limit the production of chemicals that destroy stratospheric ozone; CFCs (also a potent greenhouse gas) and halons. To take force, the protocol must be ratified by at least 11 nations representing two-thirds of world consumption of CFCs. If ratified, the protocol would freeze CFC production in 1989 at 1986 levels and require a 50 per cent cut by 1999. As of mid May 1988, the United States and Mexico had ratified the protocol.

Bilateral agreements with the USSR and China: In the past few years, EPA has established bilateral agreements with the Soviet and Chinese governments to explore greenhouse policy issues.

UNEP-WMO policy initiatives: The United Nations Environmental Programme and World Meteorological Organisation, in conjunction with a number of nongovernmental institutions, have sponsored several international conferences in the past few years to discuss the development of policies for responding to climate change. UNEP is considering establishment of an intergovernmental committee this year to explore greenhouse policy options under U.N.' auspices.

A MULTITUDE OF SOURCES

Greenhouse gases are produced by a broad range of natural and man-made processes. The burning of fossil fuels for transportation, electricity generation, and manufacturing adds carbon dioxide to the atmosphere, as does deforestation. Methane is produced in significant amounts by rice paddies and wetlands and by the digestive tracts of farm animals and termites.

Natural land emissions, fossil fuel combustion, and the use of fertilizer all add nitrous oxide to the air. Chlorofluorocarbons, historically used as propellants for aerosol cans and in the manufacture of insulating and packaging foams, are now being phased out of many U.S. commercial applications.

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Global assessment of ozone layer

A. U.S. scientist reports that a major scientific assessment will begin later this year to determine if the provisions of an international convention to limit the depletion of the Earth's protective ozone layer are adequate or need to be strengthened.

The ozone layer, which shields the Earth from the Sun's harmful ultraviolet radiation, is destroyed by chlorofluorocarbons used in refrigeration, insulation, industrial solvents and aerosol sprays. The United Nations Environment Programme (UNEP) announced recently that Uganda became the 20th country to approve the Montreal Protocol, thereby providing the necessary ratifications for the convention to go into effect on September 22. The U.S. Senate voted to ratify the treaty earlier this year.

Robert Watson, the coordinator of NASA's global habitability programme said he has been requested by UNEP to organise a scientific assessment of the current condition of the Earth's high-altitude ozone layer. Scientists from Europe, Japan, the Soviet Union and some developing countries will participate in the assessment, due to be completed by next July.

"This new scientific assessment will include the latest data from Antarctia, global trends and what's happening in the Arctic," Watson said. "UNEP believes there should then be a convening of the contracting parties of the Montreal Protocol to look at whether those regulations are adequate or whether they need to be strengthened." He added that scientists and policy makers from 48 countries meeting in Canada recently called for a complete ban on chlorofluorocarbons by the year 2000.

A NASA study in March found that the atmospheric ozone over the Earth's Northern Hemisphere had declined significantly during the last two decades. This area, the most heavily populated region of the world, includes the United States, Canada, Western Europe, the Soviet Union, China and Japan.

The report, prepared by more than 100 scientists who analysed atmospheric measurements from both ground stations and satellites, also found that the dramatic loss of ozone that has been occurring over Antarctica during the polar spring (September-October) is now having an effect on much of the Southern Hemisphere.

THE GREENHOUSE, U.S. DROUGHT LINK

Scientists at NASA sparked a controversy among climatologists by declaring that the drought now devastating much of the American Midwest and the prairies of Canada may be an early manifestation of the greenhouse effect. Global temperatures so far this year are the highest on record, continuing a strong warming trend through th Eighties.

Other scientists said that both the drought in the U.S. and the recen rise in global temperatures could b explained by natural fluctuations.

The four warmest years in the pas century — 1980, 1981, 1983 and 1987 — have all occurred this decade. Temperatures this decade have been 0.4°C higher than the average for the period between 1951 and 1980.

The greenhouse effect could be slowed, if controls restrain emissions of greenhouse gases. Besides carbon dioxide, these include methane from agricultural sources and rubbish dumps, and nitrous oxides from car exhausts and fertilisers. Meteorologists said that the immediate cause of the drought was an area of high pressure that had remained over the Central U.S. for several months.

IMPORTS OF PETROGOODS GO UP BY RS. 1,189 CRORES

The imports of petroleum and petroleum products increased by Rs. 1,189 crores in 1987-88 mainly due to higher prices in the world market and also some increase in consumption quantity.

The increase in the import of petroleum and petroleum products mainly accounted for the hike in the imports of bulk items by Rs. 1,312 crores, according to provisional figures.

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Oil struck in another Narimanam well

The Oil and Natural Gas Commission has struck oil in the fourth well at Narimanam in Thanjavur district in the onland Cauvery basin. The yield is about 350 barrels a day. The first and the third well at Narimanam are already producing crude.

Reliable ONGC sources said that the discovery of oil in the fourth well — Narimanam-4, 15 km from Nagapattinam — was significant because it brightened the prospects of the Narimanam structure. They stressed that Narimanam-4 was not an exploratory but a discovery well. The production-testing, done recently, was highly favourable. "It is behaving very well. The oil is of good quality," they said.

Drilling began at Narimanam-4 on April 14 and the targeted depth of 2,300 metres was reached. The ONGC would exploit the well by putting it under the early production system (EPS), an innovative measure to bring the hydrocarbon strike into production, without waiting for full development of infrastructural facilities. This helped not only in the early assessment of the oil reservoir/well-potential but also generated revenue.

In the onland Cauvery Basin, the ONGC is producing oil from four wells including Narimanam 1 and 3, Bhuvanagiri-2 and Kovilkalappal-4. Up to August 1, over 1.88 lakh barrels of crude has been despatched to Madras Refineries from these wells.

The discovery of oil in the fourth well came as a shot in the arm for the ONGC, which will be stepping up onland drilling operations in the Cauvery Basin. Drilling is also in progress at Peruvalanthan, Kamalapuram, Komarakshi and Kalappal-E. The ONGC is also looking for oil in the Cauvery offshore region and a well — PY-1.8 — was spudded there on July 2, 1988.

The onshore well at Peruvalanthan was spudded on July 27. The well at Kamalapuram has been drilled up to 1,734 metres. The Komarakshi well has reached a depth of 4,480 metres.

The ONGC also struck oil at Nannilam, 12 12 km west of Tiruvarur town and oil is flowing at the rate of 150 barrels a day and gas at 2,933 cubic metres.

Lubrication tech

Indian Space Research Organisation has developed a process for bonded film lubrication using Molydenum disulphide. Bonded films of Molybdenum disulphide constitute a very popular and effective approach both in aerospace (for aircraft and space vehicles) and in the general engineering industry such as automobiles, nuclear power, etc., for lubrication applications.

The bonded film provide the advantage of good performance under high load and stresses, ability to withstand stringent environment such as extreme high and low temperatures, radiation and vacuum, long-term storage stability and the least maintenance requirements.

Bonded films use a binder along with the lubricating pigment such as Molybdenum disulphide. The binder is dissolved in a solvent and lubricating pigment is dispersed in the solution. The dispersion is sprayed on the carefully prepared sliding surfaces and either cured in an oven or in air. Conventional spray painting guns are used for spraying. A large number of formulations containing Molydenum disulphide, suitable binders and solvents are available commercially in India and abroad.

Many binders such as phenolics, epoxies, alkyds, silicates, etc. are available commercially to obtain different characteristics such as excellent adhesion, air curing capability, corrosion resistance and abrasion resistance.

For space applications, the process involving inorganic binders is used.

For further details write to Dy. Director, Technology Transfer and Industry Co-operation, ISRO Headquarters, Cauvery Bhavan, Bangalore-500 009.

MALEIC ANHYDRIDE SHORTAGE IN OFFING

A severe shortage of maleic anhydride is likely to develop in the country. Manufacturing capacity is restricted to only 3,000 tpa with a single manufacturer viz. Adarsh Chemicals. Demand for the product is growing rapidly. Major uses include manufacture of unsaturated polyester resin, agricultural chemicals, copolymers, lube oil additives, fumaric acid and plasticizers. Substantial growth in demand is expected particularly for unsaturated polyester resins. This should lead to a sizeable increase in demand for maleic anhydride. Sources feel that with the expected rise in demand and increasing costs of imports licensing of additional capacity is vital. Maleic anhydride currently rules at around Rs. 45 per kg. in the local markets.

NEW PORTABLE MULTI-GAS MONITOR

The Neotronics Exotox 40 OFC, a unique three-in-one safety monitor, developed by the Spantech Group of London, recently received its certification from the Coal Mining Research Station, Dhanbad.

According to the Spantech Group, the Exotox 40 OFC is the only portable instrument which will monitor for oxygen, flammable gas and carbon monoxide. It will compute a toxic level of carbon monoxide over a time weighted average for short term alarm at 15 minutes and over eight hours to alarm at pre-set levels, warning personnel of the toxicity of the environment.

The latest instrument in this range is the Exotox 50 which will simultaneously monitor oxygen, flammable, carbon monoxide and hydrogen sulphide gases.

The Exotox range is currently in operation with companies like Indian Petrochemicals Corporation Ltd., and the Atomic Energy Authority in Bombay.

Spantech Group, London, is represented in India by Spantech India Pvt. Ltd., 28-B, Rowland Road, Calcutta,

Input-output norms for chemicals

he commerce ministry has noti- d input-out norms for exporters der the advance licensing sche- (appendix 13-C) for about 300 micals and allied products. Ex- rters of these items are allowed import raw materials at con- ssional duty.

These are: Sulphuric acid 98 per nt up; sodium sulphide 60 per nt; zinc cyanide 96 per cent; pper cyanide 98 per cent; sodium licate 99 per cent; benzene; cy- lohexane 90.8 per cent; alkyl ben- ene sulphonic acid 96 per cent; p-oluene sulphonic acid 95 per cent; ri-pentaerythritol (OH Content 5 per cent); mono-pentaerythri- ol (monomer content 96 per cent); aranitrophenol 98 per cent up; fornalin glacial; acetic acid glacial 99 per cent up; maleic anhydride 99.5 per cent; di-iso octyl phthalate; di hexyl phthalate; synthetic de- ergent; sodium lauryl sulphate rude 98 per cent; triphenyl phosphite; lead stearate; calcium stearate; aluminium stearate; butyl stearate tech; dioctyl tin oxide tech; dibutyl tin oxide 95 per cent, poly vinyl acetate emulsion solid content 48 per cent; hydrogen peroxide 35 per cent; nickel sulphate (Ni + Co 22 per cent up), nickel chloride (Ni + Co 24 per cent up); sodium naphthionate 100 per cent; 1,4-dimethoxy benzene; caustic soda 100 per cent solution (NaOH) dry base; ortho phosphoric acid 85 per cent; calcium hydroxide 98 per cent up; calcium oxide 98 per cent up; stamping foil (Hot stamping foil); trimethoprim; fenvalerate technical (Fenval EC 20 per cent brand name); cloxacillin sodium BP/IP/USP (either in powder form or compacted form); PP woven sacks; HDPE woven sacks: LDPE woven sacks; napthol AS/TR CI no. 37525; fast red TR base-CI No. 37005; reactive black-5; reactive red M-50; fast bordeaux EP salt-CI no. 37135; fast red B-salt CI no. 37125; fast red TR salt CI no. 37085; fast scarlet R-salt CI no. 37130; PTA; salbutamol sulphate; diazepam; ampicillin trihydrate, amoxycillin trihydrate; sheet glass; lead glass tube; hand out lead crystal glass ware; vinyl asbestos tile; glass fibre yarn; glass fibre woven reving (reving cloth); citric acid 99 per cent up; dibenzothiazyl disulphide 97.5 per cent up; mercapto benzetriazole 97.5 per cent up; sodium dimethyl dithiocarbonate 42 per cent; diammonium phosphate; 1000, S-1060 (coating agent); hithane — S-1070 (coating agent); hithane A-8070 (coating agent); hithane A-8006; hithane E-5300 (coating agent); hithane E-5300 M (coating agent); Besthan 9004 solid content 30 + 1 per cent (coating agent); besthan 9007 solid content 30 + 1 per cent (coating agent); white carbon (zoosil, tixosil); monogen Gr solid content 55 per cent; bicron 33 N solid content, bicron 1-6 solid content, D.O.-T.O. dioctyl tin oxide; D.B.T.O. (dibutyl tin oxide); sliband W (Releasing agent); prepared glue PVA content 25.6 per cent; pearl essence pearl content 22 per cent; cross linking agent V-CL 300 (solid content — 75 per cent); p. amino-diphenylamine; a. acid 90 per cent up (3-amino-6 chloro toluene-4 sulfonic acid); powder phenol resin (2 stage) powder phenol (resin varcum TD-2025); one stage pheno resin (flake); heat reactive liquid phenols resin (plyophen TD-2640; heat reactive liquid phenol resin (plyophen J-303); phenolic resin AI-3; alkyl phenol resin super beckacite 100; modified alcohol soluble phenol resin plyophen TD-2402; one stage liquid phenolic acid resin plyophen; phenolic resin varcum TD-2610; glyoxal resin (cleantex DS-2); epoxy resin (TE-827, 828, YD-127, 138); epoxy resin (TE 1004, KE 1004, YD-014); high impact polystyrene resin, general purpose polystyrene resin; expandable polystyrene resin; high density polyethylene resin; M.S. resin (T.R. grade); M.S. resin (G.P. grade); styrene monomer, polyurethane resin shoesole; pigment (daihan blue GS); pigment (DGN 3020 orange); polyethylene foam; M.F. resin (H.T. grade); pigment benzidine yellow GRNK; pigment (brilliant carmin 6B-210); pigment fast red FGR; pigment lake red; pigment permanent red FR; pigment brilliant carmine 6BF; pigment lake red C; pigment lake C-12; pigment diaazo yellow TR (HR); pigment brilliant ceramine (or 6B-120); pigment benzidine yellow GRF; pigment benzidine yellow 20; pigment phthalocyanine blue L-crude (C.I no. 74160); pigment phthalo cyanine blue 1450; pigment phthalo cyanine green G. EX; pigment fast yellow 5G; pigment lake red C (dye stuff); pigment phthalo cyanine blue AN new (AN Conc); pigment permanent orange R; pigment cyanic blue; direct dark green B; direct dark green B (Rifa); direct green B: acid orange II; amarthol ASSW; auramine OH/Conc.; Aniline black; acid violet 4 B; anion exchange resin; aluminium chloride anhydrous; amodiequine hydrochloride; amodiequine base; barium carbonate; benzidine di-hydrochloride; basic brilliant green colur index no. 42040; bis-acodyle BP; yara yara/beta napthol methyl ether, chrysophenine GH/G; cloxacillin sodium non-sterile BP 80; chlorobutyl hemihydrate; chryophemine GH/C; cloxacillin sodium compacted BP; caragum CP 200; cypermethrin technical in liquid; brown cork; diazepam BP 80 USP; dithranol pdr. BP/80; hydrochlorothiazide BP; isoproturon white powder, pure lemon chrome; lidocaine HCL USP; lidocaine HCI BP; manganese carbonate 100 MTS; micro crystalline wax; miconazole nitrate; fluorescent pink AMS 2407; fluorescent scarlet; fluorescent blue BLS 2548; fluorescent magenta AMS 2444; fluorescent yellow ALS 2416; fluorescent red 2333; meta chloro aniline; nifedipine; napthalene acetic acid; para anisidine; probenecid BP/USP; pyranton pamoate USP 21; rhodamine B 500 per cent; sodium pentachlorophenate; scarlet chrome; sodium citrate; salbutamol sulphate; vinyl sulphone, zinc chrome; dextropropoxyphene HCL;

2-6 dichlqro para nitro aniline; dye interemediate 1:4 sulphophenyl 3 carboxy 5 pyrazolone; dye intermediate 1:4 sulphophenyl 3 methyl 5 pyrazolone; ethian technical; mitrosin WS powder; fast garnet, fluorescent green AMS 2487; direct dark green KW; direct brown M (Rifa); dirpermit Congo red GS (Rafa); direct chrysamine; direct blue 2B; direct sky blue 5B; acid blue black 10B; cationic red GRL; cationic blue G: cationic blue GRL; enamel varnish A-type; cationic black; caitonic yellow GRL; cationic yellow 3 GH, dye stuff solvent blue K-132: dye stuff solvent yellow K-III; dye stuff solvent orange K-121; dye stuff solvent blue K-161; dye stuff solvent orange D-122, enamel varnish C-type; enamel varnish D-type; dye stuff solvent red K-132, dye stuff acid black K-381; dye stuff solvent yellow; nylon fast red M-PG; nylon fast blue L-R conc; acid black GRL; nylon fast blue R; nylon fast red R; acid chrome black T-200: acid black BRL; acid billiant scarlet 3R; cationic red 6B 200 per cent; cationic navy blue 2BL; basic malachite green crystal; cationic yellow 2 GL 20 per cent; cationic red GTL 200 per cent; cationic pink FG;

TEAM seeks govt. subsidy

The high-tech firm, TEAM (Titanium Equipment and Anode Manufacturing Company Limited) of Madras, is all set to play a pioneering role in desalination and water purification.

The company has already blazed a new trail by setting up the country's first ever sea water desalination plant employing Japanese technology on the Marina in Madras.

The demonstration - cum - proving plant with an installed capacity of 50,000 litres per day has already proved a big success. The quality of water has exceeded WHO standards and the cost of production is just two paise per litre. Institutions all over the country have sought Team's expertise in setting up similar plants.

Mr. C.H. Krishnamurthi Rao, managing director of Team, told a crowded news conference on Aug. 5 that the government should come forward to subsidise the venture in order to reduce the cost for the consumer. Team had sought the Tamil Nadu government's help to put up a one mgd plant which could serve as a model for adoption by other states. His company, he said, was willing to help other entrepreneurs to establish desalination plants.

Team is also actively involved in technologies for recyling of sewage water. It has already signed a memorandum of understanding with the Tamil Nadu Industrial Development Corporation for setting up a joint sector company which will undertake treatment and recycling of sewage water for industrial use at the Manali complex which comprises the Madras Refineries, the Madras Fertilisers and other units. The complex now receives 20 mgd from state government's metrowater of which 70 per cent is used as cooling water. Mr. Rao said that recycling of sewage water would help metrowater to divert the 20 mgd to meet the drinking water requirements of the public.

Team has followed up the MoU with Tidco with comprehensive proposals for projects costing about Rs. 30 crores. These proposals envisage an equity participation of about Rs. three crores by Tidco. Metrowater is also to be roped in as a partner. The proposed cost of production of treated water is 1.3 paise per litre. Mr. Krishnamurthi Rao said that the cost of production would depend on the concessions the government might be willing to give by way of reliefs in customs, excise and sales tax. Team's manufacturing facilities would be placed at the disposal of the new joint sector company.

He said that state-of-the-art technology was available for using sea water for cooling as well as for air cooling which will dispense with water. It was time that statutory obligation was imposed on industries to adopt sea water for cooling or to go in for air cooling. Major process industries on the Gujarat coast had already adopted sea water for cooling by installing titanium heat exchangers and condensors.

Referring to the cholera epidemic in Delhi, Mr. Krishnamurthi Rao said that the source of contamination of the drinking water had been traced to a hand pump. The Japanese had developed a hand pump technology to eliminate cholera bacilli, hepatitis virus and even AIDS virus. If N. Delhi was willing to lower the duties, these hand pumps would prove to be a blessing to India.

INPUT — OUTPUT NORMS FOR EXPORT OF PLASTIC ITEMS

Input-output norms for the export of plastic items under the advance licensing scheme (Appendix 13-C) have been notified by the government).

These export items, against which raw materials can be imported with concessional duty, are: PVC compound, cushioned vinyl flooring backed with asbestos paper. PVC films for photoalbum, acrylate monomer 99.9 per cent up, acrylic sheet centrifugal type, acrylic sheet extrusion type, acrylic sheet casting type, vinyl flooring, PVC inflatable toys, PVC rigid sheet, polyester metallised film (aluminium coated film), lacquer coated film (polyester film metallized and coated), polyester chip for moulding grade (high pressure grade), PVC clean hose, PVC sheet lm), PVC resin

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21 NEW ITEMS UNDER OGL IMPORT

The Union Government has al wed import of 21 new items und open general licence (OGL) by bri ging them in Appendix-6 of the i port-export policy.

A public notice, issued by t Commerce Ministry to give effe to these decisions, also amends t import-export policy in respect several other items by deleting o item from OGL imports and brin ing one item under the list of r tricted items.

In Appendix-6 list 3 a new ite human insulin injection has be added. This section carries the l of finished drug preparations, l saving and anti-cancer drugs all wed for import under OGL.

Two items, titanium dioxide (bo anatase and rutile grade) and plast components for automobile wirir harnesses, have been placed und Appendix-6 list 8 part 1. which con tains raw materials, componen consumables and tools allowed f import under OGL by actual use (industrial users) and export house trading houses.

Titanium dioxide (both anata and rutile grade) have been incluc ed in Appendix-6 after removing from Appendix-3 part A, whic contains raw materials, component consumables, tools and spares (othe than iron and steel and ferro allo which can be imported as restricte items.

Acetyl sulphonyl chloride has bee removed from Appendix-I list part-I, which contains the list of ra materials, components, consumabl and tools allowed for imports unde OGL by actual users (industrial) an export houses/trading houses.

By another amendment, the entr acetanilide/acetyl sulphonyl chlorid (ASC) under Appendix-13 C stipulating import-export norms for chemicals and allied products, will no read as acetanilide/n-acetyl sulph onyl chloride (ASC).

SSI's detergents may be sold through PDS in Bengal

Detergents produced by the small-scale sector in West Bengal may find its way into the public distribution system (PDS) of the state. Addressing the annual general meeting of the Small-Scale Detergents and Soaps Manufacturers' Association (SSDSMA) at Calcutta on 3rd Aug. Prof. Nirmal Bose, West Bengal minister for food and civil supplies, said the government would "definitely examine the possibility of bringing detergents under the state PDS".

However, Prof. Bose pointed out the need for a common brandname and uniform quality if detergents produced by SSIs are to be sold through the PDS. This is a problem the units will have to sort out, he said and cautioned that an earlier attempt by the government to bring television sets under PDS had failed due to the lack of a co-operation between manufacturers. Prof. Bose also mentioned that the entrepreneurs must also try to capture the market with better promotional efforts and the PDS should not be treated as a mere "protection" against market fluctuations.

Unlike television manufacturers, the small detergent units in the state are unlikely to let the opportunity of availing of the PDS go by. According to the SSDSMA president, Mr. V.K. Jain, the association is working out a scheme in association with the National Small Industries Corporation (NSIC) to form a consortium of small-scale detergent manufacturers. The consortium, he said, will maintain strict quality control and market their product under a common brandname. The NSIC has pledged both financial and marketing assistance in the venture, he said and added that the negotiations were at an advanced stage.

In his address, Mr. Jain said if the government brings detergents under PDS, the member-units of the association would be ready to supply the product at a rate of 10 per cent lower than the market price. Inclusion in the PDS would go a long way in accelerating growth of these units, he said. At present these units are neither able to financially compete with large houses, who are with units based in Gujarat and Maharashtra, who have the benefit of cheaper raw materials due to locational advantage. In fact, most of the units based in this region have a production capacity below one hundred tonnes per annum.

Of the total regional demand of one lakh tonnes of detergents per annum, SSI units in Calcutta contribute a mere ten thousand tonnes and the organised sector another 30,000 tonnes leaving a supply gap of 60,000 tonnes. This is being met by imports from other states at the moment. With the demand for detergents expected to rise further due to shortage of natural oils, Mr. Jain said growth of this industry can contribute significantly to the state's economy. The working group on this industry had estimated that by the end of this decade, detergents would have a 50 per cent share of the washing materials market.

In this context, Mr. Jain asked the government to make raw materials available to units in the region at competitive prices and exempt the SSIs from the purview of sales tax. He estimated that ST exemption would help the units scale up production to 40,000 tonnes per annum within a year. The increase in production, he added, would also make up for any revenue decrease due to higher collection from purchase tax and octroi.

Prof. Bose, however, said there was little the state could do in the matter of raw materials prices. He criticised the freight equalisation policy in this regard and emphasised that either the policy should be abolished or extended to other items so West Bengal can also benefit.

Mr. N.K. Guha, director, Small Industries Service Institute, who also addressed the gathering, advocating increased supply of raw materials and appropriate institutional support for industry. Saying that the market was yet to be tapped, he pointed out that the per capia consumption of detergents in the country was only 1.6 kg. compared with

EXCISE DUTY ON ALUMINIUM UP

The Government on Aug. 9th raised, through a notification, the basic excise duty on aluminium sheets intended for use in the electrolytic process for manufacture of aluminium or zinc from 11 per cent to 18 per cent.

The estimated revenue gain with this step is estimated to be Rs 12.17 crores annually.

Through another notification, the Government cut the basic customs duty on aluminium ingots from Rs. 1000 to Rs. 500 a tonne. The revenue loss in this is estimated to be Rs. 2.5 crores a year.

SEMINARS ON PEACEFUL USE OF N-ENERGY

A series of seminars on the peaceful applications of nuclear energy is being organised at various centres in India by the Department of Atomic Energy (DAE), in association with leading scientific and educational institutions.

According to a press release issued recently by the DAE, the first seminar is being held at the Indian Institute of Science (IISc), Bangalore, on Friday, August 12.

DUTY — FREE IMPORTS FOR THIRD COUNTRY PROJECTS ALLOWED

The finance ministry has permitted duty free imports (not necessarily in the nature of raw material or a component) of items for setting up of an industrial plant or project abroad. Such items will be for projects which will be re-exported after carrying out modifications or alignment or processing necessary for rendering them an integral part or sub-system of the industrial project or plant.

By another notification, the ministry has allowed duty free import of office equipments to the units set up under the scheme of 100 per cent export-oriented undertakings as permissible under the open gen-

Detergent demand to spur LAB growth

Worldwide demand for detergent alkylate will grow from 1.8 million metric tons in 1986 to 2.6 million metric tons by the year 2000, according to a new study by Colin A. Houston & Associates (CAHA), a consulting firm in Mamaroneck, N. Y. Almost all detergent alkylate is converted to surfactants via sulfonation. Over 85 per cent of these surfactants, are used in household cleaning products, primarily laundry detergents.

Rapid growth in the consumption of synthetic detergent in large developing countries such as India and China is fueling strong growth in demand for linear alkylbenzene (LAB), the world's leading surfactant intermediate. By contrast, North American and West European markets are mature and only moderate growth for LAB is anticipated.

Branched alkylbenzene (BAB) consumption will continue to decline due to its poor biodegradability. BAB was replaced by LAB in household detergents over 25 years ago in the U.S. and west Europe, but other regions have just begun to switch to LAB in the last few years. Latin America is the only region where BAB consumption will actually increase over the next decade.

"The most important development for current LAB producers is the rapid increase in new LAB plants in Third World and East Bloc countries", says Marilyn Bradshaw, project leader for the CAHA study. "These countries have traditionally been important export markets, especially for West Europe. By the year 2000, the regions other than North America and West Europe will consume 800 thousand tons more LAB than they did in 1986, and almost all of it will be supplied through local production".

In North America, there are only two producers of LAB — Vista and Monsanto. Plant expansions announced by both companies will raise total capacity by nearly 70 thousand tons by 1989.

In West Europe, and to a limited extent Japan, some concern has been expressed recently about biodegradability in lab tests regarding LAB. Questions have been raised about LAB residues on sludge from anerobic sewage digestors, but a number of studies are underway and data is expected to be published soon which will allay concern.

"LAB has been used for twenty-five years without adverse results", states Colin Houston, CAHA's president. "We have thoroughly studied the present issues, carefully reviewing the various test methods and results, and are confident that the complete environmental acceptability of LAB will be reaffirmed once all the evidence has been publicly evaluated. We are forecasting continued growth in demand for LAB".

CAHA is a leading authority on surfactants and detergents, and their effect on the environment. In the early 1970s CAHA was commissioned by the U.S. EPA to develop the effluent guidelines for the soap and detergent industry. CAHA's new detergent alkylate study includes a 45-page chapter on the complex topics of biodegradability and toxicity as related to LABS. The chapter was reviewed by Dr. Robert Swisher, who is generally acknowledged to be the world's foremost expert on surfactant biodegradation.

The unexpected success of heavy duty laundry liquids in major west European markets in 1987 and 1988 has spurred the development of more soluble types of LABS such as the new "Petrelab" product from Petresa, a leading producer. In the U. K., liquids are reported to have over 20 per cent of the heavy duty detergent (HDD) market, and could easily reach the same levels in France and Germany by 1995. Penetration of heavy duty liquids is expected to be slower in other west European countries.

In the U.S., liquids are estimated to account for 38 per cent of the HDD market in 1988, and will continue to increase their share.

In less developed countries, synthetic detergent powders are replacing centuries-old use of soap. Average growth rates for detergents over the next decade vary from 3-4 per cent/year in some countries in Latin America and Africa to 8-10 per cent/year in China and India.

"The future is very bright for LAB producers such as Deten and EMCA in Brazil, ISU in Korea, and the new producers in India", says Ms. Bradshaw. "Some rationalization is likely in West Europe, where reduced exports are adding pressure to an already oversupplied market. The market leaders, Enichem and Petresa, are very aggressive merchant marketers, and will probably be the least affected".

Monsanto and Vista in the U.S. are not heavily dependent on export markets, but could face increased competition from Europe for the Canadian market. The U.S. is not vulnerable to imports because of an 18 per cent tariff on detergent alkylate .

The CAHA study includes production, import, export, and consumption data by country for 1986 and forecasts supply and demand for LAB and BAB to the year 2000. Further details are available from Colin A. Houston & Associates, P.O. Box 416, Mamaroneck, New York 10543, (914) 698-3675.

FIEO WELCOMES NEW INPUT OUTPUT NORMS

The Federation of Indian Exporters Organisation (FIEO) has welcomed the establishment of input/output norms for exporters under the advance licensing scheme for 3550 more items.

The President of FIEO, Mr. Ramu S. Deora, said in a press release issued in New Delhi that this would help in cutting down delays and procedural wrangles that hamper the exporters efforts.

Calling the step as "pragmatic, bold and positive", Mr. Deora has said that the Cabinet Secretary, Mr. B.G. Deshmukh, has ensured that now the exporters will have more time to devote to export development and marketing.

Flyash : an under-utilised energy by-product

India's thermal plants that burn coal to generate electric energy are also spewing out every day tonnes of flyash, the residue of burnt coal, a waste material that has ravaged vast tracts of land in the country.

In an attempt to devise strategies to tackle this problem, experts gathered in New Delhi in June 1988 and discussed ways of utilising flyash as an energy industry by product, instead of throwing it away as a waste.

The experts attending the national workshop on flyash utilisation said the amount of flyash given off by thermal power plants will rise in the future as coal continues to remain the major source of power in the country.

Last year the country's 64 thermal power plants produced about 30 million tonnes of flyash. The figure will rise to 40 million tonnes by 1990 and more than 100 million tonnes by 2000 AD.

According to one estimate, every megawatt (MW) of power generated from coal requires one acre of land for ash disposal. With coal's rising contribution to the Indian power bank, ash disposal would require 45,000 acres of land next year, 55,000 acres in 1995 and more than 70,000 acres by the end of the century.

Exceptionally large amounts of flyash are created in Indian thermal power plants because of the relatively high ash content of Indian coal. The ash content of Indian coal varies from 10 per cent to 50 per cent.

Flyash which makes up nearly 80 per cent of the residue of burnt coal occurs as tiny spherical particles whose main constituents are silicon, iron, aluminium, and calcium. Small quantities of sodium, phosphorus, sulphur and potassium are also present. Fly-ash also contains some 20 to 50 elements in trace amounts.

Flyash is usually disposed of through one of two techniques: the wet disposal method in which the ash is mixed with water and let loose in ponds and the dry disposal method in which the ash is just spread out on vast tracts of open land.

The ash water produced by the wet disposal percolates into the ground and can contaminate the ground water. Agricultural experts say thousands of hectares of land have been rendered unfit for agriculture by the ash water. The dry disposal system on the other hand has transformed open areas where ash has been dumped into wastelands.

Over the years research on the chemical composition of the flyash has helped scientists identify several possible areas for flyash utilisation.

Flyash is now being used in civil engineering applications in many western countries including the United States, United Kingdom and Netherlands. In India, however, the level of flyash utilisation remains a low three to five per cent, experts at the workshop said.

Some Indian organisations where research on flyash utilisation has been underway are the Central Road Research Institute, New Delhi, the Central Building Research Institute, Roorkee, the Neyveli Lignite Corporation and the National Thermal Power Corporation.

Studies indicate that flyash is a versatile cement building material. A variety of blended cements with 15 to 40 per cent flyash content have specially attractive properties. They resist attack by sulphates, possess higher strengths and can protect reinforcing bars from corrosion.

Studies at the Central Road Research Institute (CRRI) have shown that flyash has a big potential in the construction of roads. The material may be used in bulk alone or in a combination with locally available soils. Laboratory tests have been encouraging, a CRRI paper at the symposium said, and large scale trials are being planned.

Flyash can act in many ways on the soil. It can neutralise the acids in the ground. It can enhance the water retention properties of some soils and it has the capability to act synergestically when used along with some fertilisers.

These properties have made scientists look for possible flyash applications ironically on agriculture, a sector which experts say, the process of ash dumping itself has adversely affectted.

Flyash can be used to reduce the acidity of highly acidic soils and make them better suited for cultivation, scientists from the Indian Agricultural Research Institute (IARI) said in their paper at the workshop.

The IARI scientists, Dr. R. K. Chatterjee and Dr. R.K. Rattan, have however cautioned that an excess of flyash could lead to abnormally high, toxic levels of certain elements in the soil which would in turn reduce crop yields.

The acid neutralising property of the flyash can also be used to reclaim wastelands. Acidity is a major factor that hinders the growth and even kills vegetation on wastelands.

Flyash contains three to five per cent of easily recoverable magnetite. Experts believe that about one million tonnes of magnetite is disposed every year through ash dumping though the magnetite fraction of flyash can be separated easily through a cost effective process.

The Central Power Research Institute (CPRI) in Bangalore has taken up laboratory studies on the separation of magnetite from flyash. CPRI researchers at the conference Dr. B.K. Chaturvedi and Dr. P. R. Krishnamoorthy said there is evidence that the flyash magnetite is better than commercially available magnetite.

Research is also underway at the CPRI on the extraction of alumina from flyash and on the development of flyash based composites.

According to a joint paper presented at the workshop by the NTPC and the Central Electricity Authority, it is possible to utilise almost all the flyash produced in the country through technologies that already exist.

But, the paper said, it would require the establishment of a dedicated organisation to deal with different aspects of the flyash utilisation programme.

COCHIN REFINERIES EXCEEDS TARGET

Cochin Refineries has set a new record by processing 442,027 tonnes of crude in July last against the target of 425,000 tonnes.

Capacity utilisation during the month was 115.6 per cent of the prorated insatlled capacity, according to a refinery press release.

Move to raise exports to finance expansion

Official sources clarified that the government had not taken any decision to suspend institutional and bank lending to large industrial houses and companies under the purview of the Foreign Exchange Regulation Act (Fera).

Referring to a report in the **The Economic Times** on Aug. 5th, officials explained that a meeting had been convened to discuss ways of developing the petrochemical industry while minimising the foreign exchange cost involved. In this context, industrialists were asked to outline their export plans. A number of proposals came up during the discussions, but these were not government decisions.

Some of the financing proposals related to bringing in additional equity from abroad, floating convertible bonds in foreign exchange and arranging for loans that would have a subordinate charge of equity. The government officials present at the meeting said they would be willing to consider such proposals. There was no reference to increasing the five per cent limit prescribed for the non-resident Indian portfolio investment scheme.

With reference to loans from the financial institutions, the subject was not focused during the meeting, but an official clarified that companies were being encouraged to raise their own resources. A second official said — "if they got the message that money from the financial institutions would no be easily forthcoming, that's true." "However, it was also pointed out that the Haldia petrochemical project was being given institutional loans."

Export incentives are not to be withdrawn from large houses, officials clarified. Instead, the government is willing to consider proposals to subsidise exports by hiking the domestic selling prices of petrochemical products, as has been done by Japan, Korea and Taiwan. As an example, it was stated that a polyester product could be sold domestically at a higher price than was normally warranted if the company concerned was exporting a certain quantity.

One of the industrialists present at the meeting said he got the impression that foreign commercial borrowings for petrochemical projects would be largely restricted to the public sector, with no real scope for private sector ventures.

Officals emphasised that the meeting was essentially meant to drive home the message that the petrochemical industry cannot expect to keep importing capital equipment and raw material without earning substantially more foreign exchange through exports than is presently the case. In this context, there had been an item-wise review of export intentions.

LUBRI-CHEM IN TROUBLE

Lubri-Chem Industries, engaged in the manufacture of petroleum specialities at Bhayandar, Thane and presently closed following a minor mishap which took place o July 28, is being victimised by th local Gram Panchayat for politic reasons, according to Mr. C.M. Ha wasiya, Chairman and Managin Director of the company.

Talking to newsmen at Bomba he said that for quite sometime th local leaders and members of th Gram panchayat had been threaten ing to close the factory on baseles charges of pollution, by spreadin misleading propaganda.

He said the incident of July 2 was mainly due to sudden disrup tion of power in one of the circula ting motors attached to a reacto vessel which was in operation. A a result, some quantity of the sou oil fell in the acid measuring tan and some sour oil also spillel out and came in contact with the water present below the reactor vessel This gave rise to release of dense fumes which, he added were not of poisonous or hazardous nature.

Mr. D.P. Chatterjee, a director said that the company which was manufacturing sodium petroleum sulphonate an import substitute since 1970, did not face any agitation from local villagers as it was found to be safe from pollution by the State Pollution Control Board.

The company, having a turnover of over Rs. 6 crores per annum and 50 odd workers, is now closed on a verbal request from the Thane Collector pending a decision to be taken on the fate of the company at a meeting on August 6, between Pollution Control experts and districts officials, he added.

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PAYMENTS TO SMALL UNITS BY BIG COMPANIES:

Legislation being finalised

The Union government is finalising a legislation to ensure that companies make payments in time to small-scale units.

The industry ministry is giving finishing touches to the proposed legislation which has already been approved in principle by the finance ministry and the Reserve Bank of India.

The legislation, it is learnt, will ensure that stringent penalties are imposed on large units which delay payments to the small scale sector. It is being framed on the basis of similar laws enacted in other countries like the UK and Japan to protect the interests of small companies.

At present, small-scale units are facing serious difficulties in meeting credit requirements and these are compounded by the problem of delayed payments. A recent official study has found that RBI guidelines stipulating that non-payment to small units beyond 120 days should have first charge on bank lending, are not being followed. By and large, ancillary units continue to suffer from delayed payments.

This has also been one of the major factors contributing to sickness in the small-scale sector. In fact, it is felt that this legislation will go a long way in reducing the incidence of sickness in this sector.

Although it was originally proposed to introduce the new law in the current session of Parliament, it may not be possible to do so now as details are still being worked out. A section of official circles however, are sceptical about the impact on the proposed legislation. It is felt that it may not be possible to actually implement such legislation especially as several public sector units may be among the defaultors.

On the other hand, those in favour of the new law argue that it would definitely force large units to pay long standing arrears to ancillary units. Besides, it is pointed out that drastic measures will have to be taken to prevent the growing sickness in the small sector.

The magnitude of this problem can be gauged from the fact that nearly 10 per cent of the total small-scale sector is sick. Losses on account of non-utilisation of productive assets due to sickness have a direct bearing on output and employment, thereby hampering the developmental process, say policy-makers.

It is therefore, essential to take steps immediately, they maintain to combat the problem of sickness in the small-scale sector.

The latest official data reveals that the number of sick small-scale units was 1,29,000 at the end of January 1986, involving an outstanding bank credit of Rs. 1,185 crores.

Of these, 13,028 units with an outstanding credit of Rs. 271 crores were considered as potentially viable by the banks, while the remaining 1,03,000 units were considered unviable.

NICKEL ISSUE PRICE: FASII THREAT

The Federation of Associations of Small Industries of India (FASII) has threatened to ask its constituent units using nickel to down their shutters if the Government fails to take a decision on the issue price of the commodity by August 10.

In a news release issued at New Delhi recently, the FASII President Mr. P.B. Duggal, has, however, expresed the hope that the Government will realise the gravity of the situation and bring down the issue price of nickel by suitably adjusting the customs duty as had been done earlier in the case of copper.

The release has observed that nickel is a 100 per cent imported raw material canalised through the Minerals and Metals Trading Corporation and is a vital raw material required by the bicycle industry.

The high-power panel set up by the Government in May to tailor the customs duties on imported commodities with reference to their international prices has in the meantime proved "to be a farce", the release says. The issue price in June this year was raied to Rs. 4.25 lakhs per tonne (an increase of Rs. 30 per kg over the May price level) and continued at that level in July, the release adds.

Even in August, to the utter dismay of the federation, the issue price was further raised to Rs. 4.35 lakhs per tonne (an increase of Rs. 10 per kg over the June-July price level) because of the callousness on the part of the panel, the release has said.

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Supercomputer coming in September

The much-awaited US supercomputer Cray XMP-14 will arrive next month.

This will be installed at the intermediate weather forecasting centre, being set up in New Delhi.

This largest-ever flow of advanced equipment from the US to India is the result of the Indo-US memorandum of understanding on high technology signed in 1985.

The Indo-US science and technology co-operative, which tends to be at the high end of the state-of-the-art, has led to Indo-US high-tech co-operation in materials, vaccines, biotechnology, computers, electronics, aerospace and telecommunications.

This co-operation will get a further boost with the visit of the US Presidential science advisor, Mr. William Graham, scheduled for next month, according to Mr. A.S. Ahmed Meer, counsellor for scientific and technology affairs in the US Embassy at New Delhi, the largest science office of any American embassy in the world.

At present there are more than 300 Indo-US collaborative science and technology projects funded by a dozen leading US technical agencies.

Mr. Meer said: "Today we have only scratched the surface of the potential for Indo-US science and technology co-operation. A huge latent demand exists for additional Indo-US science and technology activity."

The six lakh Americans of Indian origin comprise one of the most highly educated and technologically-oriented communities in the US. Some of them like Nobel Prize winners Hargobind Khorana and Chandrasekhar are beacons to young Indian students and researchers, he said.

"The reputation of Indian students and researchers is high, and many Americans are keen to co-operate with them," Mr. Meer added.

GAS PRODUCTION

Go-ahead for new north sea gasfields

The UK Government has given the go-ahead for development of the Amethyst East and West gasfields in the Southern North Sea.

Located 45 kilometres off the north-east coast of England in 30 metres of water, Amethyst has estimated recoverable gas reserves of 24,000 million cubic metres. Production will commence from Amethyst East in October 1990, and by 1991 will be supplying British Gas with a daily contract rate of five million cubic metres of gas.

The development by Britoil, costing some £ 260 million, will initially consist of two unmanned steel platforms on Amethyst East, linked by a 762 mm pipeine to a land terminal where British Gas will treat and process the gas.

In order to maintain the production profile, it is planned to install a third unmanned platform on Amethyst West, no later than 1992. The exact timing will depend on reservoir performance. A total of 20 production wells will be drilled on the two fields, with drilling scheduled to start in the summer of 1990.

Amethyst will be the first North Sea gas field to be controlled entirely from an onshore location. British Gas, under contract to the Amethyst partners, will provide day-do-day operational services from the land terminal, extending to limited intervention on the platforms. Electrical power on the plat forms will be provided via a power line laid from the coast.

Britoil's Amethyst project team of 25 is based at Glasgow in Scotland. At peak, the project will provide employment for more than 300. The construction phase, lasting approximately a year, will require around 250 jobs. Design engineering contractors, Humphreys & Glasgow, are working on the design which is now nearing completion. Fabrication contracts are expected to be placed later this year.

ENVIRONMENTAL MANAGEMENT PLAN FOR COALFIELDS

The Government has prepared advanced environmental management plans for three coalfields — Talcher, north Karanpurar and Singrauli. The Environment and ests Minister, Mr. Z.R. Ansari, ed in the Lok Sabha that the include carrying out environme ly compatible mining opera and ecological restoration of m areas.

Such plans are also being dr up for seven more coalfields — ria, Raninganj, Godavari Va Wardha Valley, One-B Va East Bokaro and West Bokaro.

The Central Mine Planning Design Institute Ltd. has also ried out a survey of all abando coal mines and suggested recla tion, including ecological rest tion, of over five hundredd mi he added.

PERSPECTIVE PLAN FOR INSTALLING BIOGAS PLANTS

The department of non-conv tional energy sources (DNES) p to instal about 12 million bi plants in the country by 2000 A perspective plan to this effect been prepared by the departm according to Mr. Maheshwar Da secretary, DNES.

Mr. Dayal, who was addressin meeting of voluntary agencies gaged in the promotion of renewa sources of energy, in New De said R and D efforts were be undertaken to construct bio plants that could produce better sults using smaller amount of wa

According to an official relea over 10 lakh biogas plants of fa ly size have been set up in the co try so far. These are resulting i saving of about 40 lakh tonnes firewood valued at Rs. 146 crores year.

The biogas programme, the me ing was told, had picked up well the last three years. During 19 88 1.73 lakh biogas plants were stalled against a target of 1.2 lak

HPCL APPOINTMENTS

Mr. A.K. Roy and Mr. H.L. Z shi have been appointed Gene Managers in the departments of dustrial Relations and Administr tion and Human Resources Devel ment of Hindustan Petroleum Co poration Limited, respectively, Corporation release has said.

Unique phase separator developed

n indigenously developed phase rator to separate water or aq- s solutions from water immis- solvents, is being offered to industry by M/s. Emmessar Met- Pvt. Ltd., Bombay. The phase rator finds wide applications in chemical, pharmaceuticals and d industries. Offered under the de name of 'VATSAA-7', the se separators are the normal la- ratory filter papers chemically ated to impart special property. TSAA-7 is available in two forms) Aqua Bloc, (2) Aqua-Flo.

Unique Phase Separator

Aqua-Bloc: will separate water or aqueous solutions from water nmiscible solvents of both higher nd lower viscosities and densities. y virtue of being hydrophobic, it etains the aqueous phase (or ater) while allowing the organic hase to pass through. Additionally, t also filters the solid phase, an essential requirement in (Spectrophotometry. The treatment to the paper s so devised to obtain highest level of functionality and durability under varying and demanding physical and chemical conditions generally found in the research and quality assurance laboratories, in chemical, pharmaceutical and allied process industries. The technology nvolved is entirely indigenous and functionally and qualitatively equivalent to any of the imported phase separators.

Aqua-flo: Functionally same as Aqua-bloc with one basic difference. Being hydrophilic, it will retain the organic phase and the solids, while allowing the aqueous phase (or water) to pass through. Here too, the technology involved is indigenous and the product does not seem to have an equivalent in the world market.

Utility: Both Aqua-Bloc and Aqua-Flo have extensive application both in the laboratory and in industry for testing and production oriented processes, respectively.

All the R & D and Quality Assurance laboratories in chemical, pharmaceutical and allied industries, hospitals, pathological laboratories can use Aqua-Bloc and Aqua-flo for:

1. Routine Solvent Extraction; 2. Metal Extraction by Elution and Solubility (Trace Metal Determination); 3. Determination of Blood Cortisol; 4. Screening of Urine for Drugs of Addiction; 5. Analysing Organic Additives in Industrial Solutions; 6. Analysis of Foods and Drinks; 7. Analysis of Pollutants in Water; 8. Analysis of Effluents in Industrial Wastes; 9. Thin Layer Chromatography; 10. Oil and Water Separation; 11. Ether and Water Separation; 12. Kerosene and Water Separation.

Typical solvents that can be separated:

1. Benzene; 2. Toluene; 3. Carbon Tetrachloride; 4. Chloroform; 5. Cyclohexane; 6. Kerosene; 7. Ether; 8. Trichlorethylene; 9. Methanol and ethanol in low concentrations.

Special Needs: Special sizes and quality of the paper can be treated and supplied to particular needs of the clients. Additionally, filter cloths of selected mesh and strength can be custom made to meet industry's process and production requirements.

The following advantages are claimed by the manufacturers. Vatsaa-7 is: 1. Easy to use, requiring no special skills for the attendant; 2. The phase separation is rapid and economical; 3. The phase separation is complete without leaving any traces of one phase in the other; 4. Cumbersome process involving separating funnels and fragile apparatus are avoided; 5. Large number of samples of different nature of mixtures can be simultaneously filtered by a single operator; 6. Continuous attention to filtration is not required, leaving the operator free to attend to other work; 7. The process of phase separation is clean and tidy; 8. The system is completely energy saving; 9. The product is based on indigenous technology and indigenous source of supply, ensuring no lead time requirement for procuring; 10. Substantially cheaper than the imported equivalents.

Further information can be obtained from M/s. Emmessar Metcast Pvt. Ltd., 5-C, Settminar, Pedder Road, Bombay-400 026. Phone: 365462.

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Company Notes

INDO-FLOGATES, IPICOL TIE UP

A Rs. 15-crore project to manufacture tabular alumina, a hightech product from alumina, has been finalised by Indo-Flogates Ltd. and IPICOL.

This will be the first major down-stream venture for utilising alumina from the eight-lakh tonne refinery of the public sector National Aluminium Co. Ltd. at Damanjodi in Koraput district which has been fully commissioned recently.

Ipicol has signed a joint venture (viz assisted sector) project agreement with Jagdal Investment (P) Ltd. an associate of Indo-Flogates, for setting up a facility in Bhubaneswar with a capacity of 6,000 tonnes per annum, with technology from Alcoa of the US which holds world monopoly in tabular alumina.

A highly successful venture, Indo-Flogates makes slidegate refractories at its plant in Rourkela and has declared dividend for the past three years since commissioning. The refractories are supplied to steel plants. Tabular alumina, which is required for manufacture of slidegate refractories is at present fully imported by the country. Alcoa (US) is reported to be ready to part with its closely held technology for tabular alumina in view of the projected fall in steel consumption in the developed countries and sharp increase in steel production in the Third World. The item is now manufactured only by Alcoa both in the US and through its subsidiary in Japan. Alcoa has also reportedly sold the technology to China recently.

Being a technology-intensive item, tabular alumina will represent a ten-fold value addition, sources said.

Against a price of less than Rs. 3 per kg of alumina, the cost of tabular alumina per kg will be about Rs. 30. While Indo-Flogates will consume 2,000 tonnes of tabular alumina for its slidegate refractories plant in Rourkela, the rest will be sold to other refractories as also manufacturers of HT insulators, spark plugs and electronic items. The annual domestic demand by 1991-92 is estimated capacity of the proposed joint at 6,000 tones. Equivalent to the venture, annual consumption of alumina by the plant will be around 8,000 tonnes. IPICOL has obtained SIA registration for tabular alumina.

IPICOL is also taking steps to obtain technology for recovery of gallium from waste liquor of alumina, it is learnt. The corporation has also promoted a venture for utilising red mud, the biggest waste product of the alumina refinery in terms of volume, to manufacture red mud plastic corrugated roofing material. It has also commissioned Dasturco for preparing plans for a chemical complex based on alumina at Damanjodi.

Meanwhile, National Aluminium has targeted to produce 5.4 lakh tonnes of alumina during the current year & has produced 1.01 lakhs tonnes in the first quarter. Its exports of alumina so far this year totalled Rs. 23 crores against a target of Rs. 100 crores which the company is hopeful of reaching in view of the firming up of international prices in recent months.

MAJOR UPHEAVAL IN PFIZER MANAGEMENT

Pfizer India is undergoing an upheaval in the top management, following the appointment of an expatriate as managing director.

The production director,
V. Seshadri, who served w
the company for 24 years a
was tipped to become the n
chief executive, has resign
Indications are that one m
senior director may follow s
creating a serious managem
crisis.

The appointment of an ex
triate comes only two mont
after the company diluted
shareholding to 40 per cent
become an Indian company.

Mr. Jensen was initially a
pointed in the specially-cre
ed post of president of the co
pany in September last ye
Permission was obtained fr
the department of chemicals a
petrochemicals for this purpo

Since the post of managi
director, however, needs to
approved by the department
company affairs, Pfizer filed
application for the appointme
about two months ago. Appro
al has not yet been obtained, b
company sources are confide
of its coming through.

Enquiries from the depar
ment of company affairs, on t
other hand, indicate that the a
plication will be thorough
scrutinised before any final d
cision is taken.

Sources point out that M
Jensen has worked at the Par
office of Pfizer for several year

S.I. VISCOSE TO MAKE TITANIUM DIOXIDE

South India Viscose Ltd.
contemplating floating a woo
based company for setting up
paper and pulp plant in Wes
ern Australia with a tie-up a
rangement.

This was disclosed to pre
persons in Coimbatore by M
Kesavamurthy, Managing D
rector of the company. The pr
posed company would go in
the international capital ma
ket after completing the dial

gue with their counterparts in Western Australia, he said. Proposed production will be of the order of 2.5 lakh tonnes of paper per year in the initial stages, he added.

S.I. Viscose will give the technology and the Australian company will undertake the marketing as it will contribute 36 per cent of the capital. The plant will be located in the backward area of Wicap in West Australia.

The company has proposed several projects in its quest for modernisation and diversification, he said. It will set up a food yeast industry, utilising a waste by-product of the viscose plant. It will be entering into technical collaboration with a Spanish company and the cost of the project is estimated at Rs. 12 crores. The scheme will fructify in about two years.

The company also proposes to put a up separate industry in Cuddalore for the manufacture of titanium di-oxide used by the paint industry. The proposed industry will utilise the ilmenite sand available in South Arcot district for its manufacture.

The project cost is estimated at Rs. 45 crores and a target production of 25,000 tonne a year has been fixed. The company has not yet made the technical collaboration arrangements which will be concluded with the UK or France or Yugoslavia.

COLOUR CHEM LTD

The sales turnover of Colour Chem Ltd., net of excise duty, increased during the year by 9.4% to Rs. 7324.48 lakhs from Rs. 6695.00 lakhs achieved during the previous year. Off-take for products for the textile industry declined marginally from the levels achieved during the previous year reflecting the continuing affliction of this major consuming industry. Sales of pigments for non-textile applications also did not record any improvement. However, sales of leather chemicals increased significantly consequent upon the spurt in the export of the leather industry. The offtake for organic intermediates manufactured by the company also registered satisfactory growth.

Exports

Export earnings of the Company during the year amountedd to Rs. 912.24 lakhs FOB as against Rs. 838.85 lakhs in the previous year, registering an increase of about 9%.

Profitability

During the second half of the year under review, deterioration in the exchange rate of the rupee vis-a-vis principal foreign currencies resulted in a steep increase in the landed cost of raw materials imported by the Company. Sporadic shortages accentuated the increase in price of essential inputs — both imported and indigenous — resulting in a squeeze on the margins earned by the Company. Since the close of the year, shortages of such essential raw materials such as Butyl Acrylate Styrene Monomer, etc. have become endemic and the pressures on the margins of many product lines manufactured by the company continue unrelieved. The company is endeavouring to maintain its market share, capacity utilisation and profitability in the face of these adverse factors.

Projects

The implementation of the Industrial Licence held by the Company for the manufacture of BON Acid — a dye intermediate — was completed during

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the year. The plant with an installed capacity of 300 t.p.a. has been commissioned successfully and the throughput and quality have been stablised. This project will assure supplies of a vital intermediate of the required quality, of importance to the company's business in organic pigments.

The efforts of the company to diversify its activities so as to reduce its excessive dependence on products for the textile industry are continuing. The project to manufacture more organic chemical intermediates involving complex technology is making steady progress.

Safety and Ecology

The company's commitment to improving safety and protecting the environment continued to find expression in a number of schemes and programmes aimed at strengthening the machinery for improving safety in and around the plants. Having introduced an "On-site Disaster Plan' in the preceding year, the company actively participated in the efforts of the district Collectorates, both at Thane and Roha, and other Government bodies in the preparation of an off-site disaster plan for their respective areas.

Vanavil Dyes and Chemicals Limited

Vanavil Dyes and Chemical Limited (VDCL) recorded good progress during the year ended 31st December 1987, earning, for the first time since its inception a net profit of Rs. 14.59 lakhs for the year against the loss of Rs. 21.67 lakhs incurred during the previous year. The cumulative loss carried forward in the accounts of VDCL (after providing for cumulative depreciation of Rs. 135.82 lakhs) sto
reduced to Rs. 91.09 lakhs.

The improvement in the c
erational results was larg
due to the successful impleme
tation of the package of reviv
rehabilitation measures evolv
by VDCL in consultation w
the financial institutions and t
promoters. Consequently, the
was a significant increase in t
volume and value of productio
sales, exports and trading ac
vities.

As part of the said package
measures, VDCL increased
equity capital base from
180.00 lakhs to Rs. 240.000 lak
by issuing "Rights" shares of
aggregate face value of Rs. 60
lakhs. The promoters, Colo
Chem and Tamilnadu Industr
Development Corporation Lin
ted, subscribed to their full e
titlements of 25% and 26% re
pectively of the said "Right
issue while the financial ins
tutions took up that part of t
"Rights" issue of VDCL whi
remained unsubscribed by t
other shareholders.

Haycolour Limited

Notwithstanding the contin
ed disturbed conditions in ce
tain parts of the island, Hayc
lour Limited (HCL) — the co
pany's joint venture in Sri La
ka — maintained the profita
lity of its operations from incr
ased sales and earned a net pr
fit of SL Rs. 11.97 lakhs duri
the year ended 31st March 19
The accumulated losses of H
as at 31st March 1998, after pr
viding for cumulative deprec
tion of SL Rs. 33.68 lakhs, sto
reduced to SL Rs. 12.06 lak
only.

Proposals to widen the man
facturing base of HCL so as
place its profitability on a sou
footing, which were kept in ab
yance earlier, are now bei
pursued for early implement

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Highlights in Chemical Technology - Part II

A THERMAL BIOMASS GASIFICATION PROCESS DEVELOPED BY BATTELLE ON THE THRESHOLD OF COMMERCIALIZATION

Battele Pacific Northwest Laboratories (Richland, Wash., USA) has developed a thermal biomass gasification process, for treating wet organic industrial biomass from industries. The industrial biomass may be in the form of a slurry, such as spent grain from breweries, potato peels, apple and grape pomace, cheese whey, and wastewater from treating fruits and vegetables.

Usually, wet organic materials cannot be treated cost-effectively via thermal methods for biomass gasification, reports Battele's researcher John L. Sealock. But that is not a roadblock in the new Battelle's thermal process. In the Battelle s process, a 90% water slurry of the material is pumped into a reactor, where it flows over a proprietary translation metal catalyst. The reaction temperature range from 350°C to 450°C, depending on the feed, while high pressures of 2000-4000 psi keep the water from evaporating and thereby save energy. The biomass is gasified in solution, and the gases are separated downstream from the reactor.

The above proces has been licensed to Onsite Co. (Pasadena, Calif.). This company plans to produce commercial systems that companies use to treat their wastes and simultaneously produce a medium — Btu methane and carbon dioxide gas mix for process heat or generation of electricity.

Battelle has tested a process in bench scale, where the catalyst is contained in a spinning basket. The commercial unit of Onsite, however, will use a fixed-bed system. The Company hopes to have a 5 tons/day (wet) mobile pilot plant in operation by the end of 1988. It also has plans to develop commercial modules that will be capable of handling up to 100,000 gal/day. (Chem Wk., 4/20/88, p. 37).

URANIUM NITRIDE — A NEW FUEL FOR NUCLEAR REACTORS IN SPACE

Uranium nitride has been developed as a new fuel for nuclear reactors in space. The researchers at Los Alamos National Laboratory (USA) have begun production of uranium nitride in pelleted form. The reactor, part of the Strategic Defence Initiative (SDI), is intended for defence and scientific applications that require more energy, than can come from solar cells, batteries or radio-isotopes or that require a long lifetime or solar independence.

The reactor dubbed SP — 100, would produce tens to hundreds of kilowatts of electricity and is being designed to operate at full power for up to seven years, for such applications as deep space probes and ferrying supplies from one earth orbiter to another. Uranium nitride is a denser fuel than the uranium oxi-

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de used to fuel commercial nuclear reactors. A reactor fueled by uranium nitride can have a smaller core, an important advantage for space applications. (C & EN, 2/22/88, p. 18).

FUJI CHEMICAL DEVELOPS A NEW SYNTHETIC METHOD FOR PRODUCING OPTICAL ISOMERS

Fuji Chemical, a bulk manufacturer subsidiary of Dai-ichi Seiyaku has recently developed a new efficient method for the synthesis of optically active compounds, which is reported to be 100 times more effective than conventional methods.

The method developed in collaboration with Prof. Kazyo Achiwa at the University of Shizuoka, involves use of a combination of Rhodium with BCPM (-25, 45) — N— tert — butoxycarbonyl — 4— dicyclohexylphosphino — 2 — diphenyl phosphinomethyl pyrolidene) as a catalyst. The rhodium is reusable and the method is expected to cut costs substantially. At present optically active compounds account for about 40% of Fuji's product sales. (Scrip, 4/1/88, p. 24)

PLASTIC MEDIA BLASTING — A SLOW NON-TOXIC PROCESS TO STRIP PAINTS

Battelle Laboratories is evaluating on behalf of the US Air Force a new process that strips paint from metal without the use of solvents, which are now being severely restricted by the EPA.

The process called "Plastic Media Blasting" involves blasting painted aircraft surfaces with tiny non-toxic beads to remove paint. They can be collected by a suction device for reuse. Battelle is seeking the best bead material for use on a variety of aircraft and other products. It is also exploring the feasibility of using the process to strip paints from composites. (Chem. Wk. 5/11/88 p. 17)

LARGE SCALE SYNTHESIS OF NITROGEN PENTOXIDE DEVELOPED BY DEFENCE RESEARCHERS IN BRITAIN

Nitration is one of the important reactions in organic chemistry. This is because so many processes depend on the intr duction of a nitro group (NO into a molecule. Explosives, f example have several nitro gro ps, which make the molecu highly unstable. Introducing nitro group into a molecule als gives it a 'synthetic handl which chemists can use synthesise other useful con pounds, such as pharmaceu ticals, pesticides and dyestuffs

Chemists have known abou the strong nitrating power nitrogen pentoxide for over century. It will do everythin and more, that nitric-sulfur acid mixture can do, bu faster at much lower temperatu res, and without the need for su furic acid. Nitrogen pentoxid can also be used in solvents tha are not based in water, so tha molecules that are very sensitiv to water can be easily nitrated The problem has been to ge enough nitrogen pentoxide fo large scale application in indus try. This is because nitrogen per toxide is difficult to obtain in pure form, decomposes easily a room temperature and takes u water very readily — to form ni ric acid.

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Now chemists (Peter Golding, Greville Bagg and their team) at the Royal Armament Research & Development Establishment at Waltham Abbey, Essex, UK, have perfected the large scale synthesis of nitrogen pentoxide. They used an electrochemical cell divided in two by a semi-permeable membrane. Two electrolytes both based on nitric acid, are continually flowing through the two halves of the cell. The nitric acid is split by the electric current passing between the electrodes, into nitrogen pentoxide and water. Another oxide of nitrogen, dinitrogen tetroxide, combines with the water in the other half of the cell, to regenerate nitric acid.

The nitrogen pentoxide is extracted by being frozen. By this process, nitrogen pentoxide could be obtained in kilogram lots.

It is still too early to be sure how economic nitrogen pentoxide will be compared with the traditional nitrating process. Nitrogen pentoxide produced by the above process is 4 to 5-times more expensive than the nitric acid used to make it. Also, the cost of the process plant is likely to be high, because it is produced in severe conditions, but no higher than conventional nitrating plants where harsh environments are also necessary.

Some of this cost will be probably offset by economies in reaction times and temperatures, and by the increased purity and yields that will result from using nitrogen pentoxide. Traditionally, industry has made explosives, pharmaceuticals, dyestuffs, pesticides etc. by using a nitrating agent consisting of a mixture of concentrated nitric acid and sulfuric acid. (**New Sc.** 4/28/88 p. 41).

DATABASES TO HELP ORGANIC CHEMIST IN SYNTHESIS

Researchers in pharmaceutical and chemical companies will be able to design new drugs and chemicals much more efficiently and cut costs using a commercial database containing chemical reactions. This database has been designed by chemists at the University of Leeds (UK).

Peter Johnson and a consortium of academics have built a knowledge-based system called ORAC, which covers thousands of reactions abstracted from the chemical literature. Organic chemists will use ORAC to choose the appropriate chemical reaction for a particular step in a synthetic strategy, without having to spend hours searching through the library.

The consortium has compiled the database over several years and has now set up a company to sell it and the software to chemical companies. A number of companies including ICI, Pfizer, Smith, Schering, Firmenich, Sandoz and Agfa Gaevert have already bought ORAC. The business is now worth several million pounds sterling.

Companies are particularly interested in computerised synthesis because it is extremely expensive to develop biologically ac-

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tive materials. Designing from readily available raw materials the synthesis of drugs and other compounds that have a complex molecular structure may involve many chemical transformations. Choosing the right reaction to carry out the transformations is vital in terms of efficiency and economics. Until now, the chemist has had to rely on a wide knowledge of organic reactions combined with an intuitive feel for synthesis.

Some organic chemists are now supplementing this traditional approach with computer-aided methods, not only for selecting from among the many reactions but for designing synthetic strategies, which also requires experience and imagination.

When chemists design a synthetic strategy, they usually think about the target molecule — an antibiotic, for instance — then they work backwards from a sequence of reactions until they arrive at simple starting materials. It is a bit like playing a game of chess in reverse. The problem is that, as in chess, the number of possible moves increases rapidly the more steps there are. Chemists end up with a rapidly branching "synthesis tree". So it is difficult to determine the most efficient route.

Johnson and his colleagues have also developed an expert system to help in the design of synthetic strategies. The work is an extension of a programme called LHASA that was created by Eli Corey at Harvard University in the late 1960s. A few years ago, British academics and companies formed a club to use and improve the system. Most of the larger pharmaceutical companies in Britain are
the LHASA club.

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r electro-filtering pro aden flue gas passes igh voltage electrical captured at one of the It is removed from te by periodic mech nering. Henkel's adap Sodium tetrasilicate was the introduction cial additives : one to deposition on the uler and one to induce ion of dust particles. ss is now operating at at Dusseldorf — Hol where sodium tetrasili ade for detergent-inter applications. (Chem. 88, p. 49)

ANGE POLYMERS ED TO SCAVENGE TAL LEVELS

ech International (Mid h) has received an exclusive licence from Dow Chemical to develop and market ion-exchange polymers based on Dow's ethylene acrylic acid copolymer resin. The ion-exchange polymers — which scavenge metal ions in aqueous solutions — can reduce toxic metal levels from p.p.m. range down to a low p.p.b. one.

Advantages of the polymers are speed of reaction, ease of handling and long shelf-life, as well as lack of toxicity and ability to incinerate should the value of metals justify recovery.

Applications that Omni is now developing include removal of low concentrations of toxic metals from potable water and recovery of such valuable metal ions as silver and platinum from waste streams. Also being developed is removal of toxic ions, live chromium and zinc from waste streams as well as polishing of effluant from ion-exchange systems. The polymers can be used in beds and filter cartridges and can be introduced into flowing streams and filtered out downstream. However, it is reported that the new polymers are not yet economically competitive with present commercial ion-exchange resins for removal of substantial quantities of metal ions from a stream. (Chem. Wk., 4.8.88, p. 48)

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Flat paper batteries can be moulded to meet several needs. These paper batteries have an electrolyte coating instead of the metal electrodes used in conventional batteries.

The cells that are normally used in our electronic systems have an ionic conductor — a liquid or a paste — that conducts electric charges from the metallic electrodes. The material used in the newly developed battery is an insulating polymer, containing a powder with copper base, capable of conducting electric charges. The polymer is dissolving in an organic solvent and a non-metallic electric conductor (powder) is added to the solution and blended. The slurry is then applied on to a thin backing sheet and dried.

The thin sheet is then placed between metal foil electrodes and

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sealed with plastic. Now the micrometer thick paper becomes a versatile source of power. The cell can be bent to any shape desired during manufacture. The solid electrolyte does not leak and works in a temperature range of +100° to —60°C.

It could be used to provide power to heart pacemakers, portable computer memories, musical greeting cards. It can also be used in space as this electrolyte does not degrade in high vacuum as do the other electrolytes (Science Age, 1/1988 p. 30)

A NON-POLLUTING TECHNOLOGY FOR ULTRAMARINE TYPE PIGMENT

Relatively non-polluting technology to make a pigment related to ultramarine (Pigment Blue 29) has been developed by researchers at George Institute of Tech- (Atlantic, Georgia). The Atlanta researchers coat a zeolite of proper particle size with sulfur and fires it. Though small amounts of sulfur dioxide are generated, the amount is much less than with the traditional process of firing a mixture of Kaolin, soda ash, sulfur and charcoal. The firing temperature in the new process (now patented) also is lower, resulting in significant savings in energy costs.

The product colour is identical to that of ultramarine, but the range of elemental composition is wider than the Na, $Al_6Si_6O_{24}S_3$ of ultramarine. The x-ray powder pattern indicate that it has a different, unknown crystal structure. Ultramarine produced by the new process could find use in food, cosmetics, inks, rubber, plastics, paints and sc (C & EN, 9/7/87, p. 30)

OXYNITRIDE GLASS TRANSFORMED INTO CERAMIC FIBRE

Japanese researchers at Sh dzir Corporation and unive have developed technology transforming oxynitride glass fibre using a new spinning t nique.

Oxynitride glass is compo mainly of nitrogen, oxygen silicon and also contains s metals as magnesium, alumin and lanthanum. It is producec melting glass powder contair all these components withir crucible. The Company has neered a new process to intro ce nitrogen in high concentra into the raw material. The gl has a large modulus of elasti and is resistant against acids alkalis.

The new fibre's physical p perties are: tensile strength 5 600 kg/mm² and modulus in t sion, 20-25,000 kg/mm² those of ordinary pitch-b ed carbon fibre — 300-4 kg/mm² and 13-20000 mm², respectivaly. It is gray its cross section is circular. diameter ranges from 7 to 20 crons.

The new fibre is dubbed 'Ceramic Fibre'. The compa has installed 60 tonnes/yr pi plant and sample delivery begun. Its price is less expens than carbon fibre.

The Company expects the product to be used as reinforci fibre for fibre-reinforced pla and ceramics and take the pla of carbon fibre. It expects outlets for the product in co for optical fibre and covering electric wires. (Japan Chem W 3/24/88, p. 6)

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New Products

NEW RANGE OF GRANULATORS INTRODUCED

APV Chemical Machinery Limited (formerly Baker Perkins) is introducing a new range of continuous granulators designed specifically for the pharmaceutical industry.

PGX machines will wet mass, granulate and produce a free-flowing granule; or extrudate for spheronisation and encapsulation. 30 and 50mm screw size diameter machines are available, offering outputs from 20 to 200 kg/hour.

Continuous mixing can bring the pharmaceutical industry significant improvements compared with the batch alternative — manpower reduction, improved product consistency, increased up- and downstream options, closer process control, and higher outputs.

PGX machines incorporate an integral control panel, and are finished in stainless steel to pharmaceutical industry standards. Various die options are available, and the screw configuration can be easily changed to meet various mixing requirements.

These machines are also suitable for other applications, including some in the food and bio-chemical sectors.

PGX Continuous Granulator

APV continues to offer batch granulators in a range from one to 1,500 litres working capacity which covers all research, test and production needs. Also available is the GD2000 automatic granulation end point monitor, which determines automatically the optimum point of granulation of products being prepared for tabletting.

For more details contact: APV Chemical Machinery Limited, 2 Lygon Place, London SW1W OJR.

THREE-WAY EFFICIENCY: NEW INSULATING PANELS FOR FLAT ROOFS

Three things characterize the compression-resistant Polythan insulating panels recently developed by Steinbacher Energiespartechnik in Erpfendorf/Tirol (Austria) — maximum thermal insulation, soundproofing and flame retardance. These properties are ideally combined in the composite material made of rock wool and a rigid polyurethane (PU) foam based on Bayer AG's *Baymer* raw material.

These panels offer the best insulation currently available and therefore, significantly reduce energy losses. The combination of rock wool and polyurethane also provides soundproofing, a feature which is gaining importance. Furthermore, the rock wool improves flame retardancy.

The panel measure 60 cm X 120 cm and, as they are thin, light and accurately-sized, they are easily fitted on-site to the installed vapour barrier. The PU insulating panels are capable of withstanding high loads and also ensure distribution of the forces which occur as the roofing

Three-way efficiency new insulating panels for flat roofs

skin is put into place, e.g. where a heavy hot-air welding unit stands.

For further information contact: Public Relations Department, Corporate Staff Division, Bayer AG, D-5090, Leverkusen, Bayerwerk, West Germany.

STATIC MIXER INSENSITIVE TO CLOGGING INTRODUCED

Fluids containing fibres and solid lumps can be mixed with the new Sulzer SMF static mixers without risk of clogging. The intersecting vanes of the mixing elements do not touch and hence material can flow freely. This prevents the solids sticking and slowly accumulating, as in conventional static mixers.

SMF mixer of 100mm NPS with removable mixing elements.

These efficient mixers have a wide application range. Typical proven applications include admixing polymer solutions to sludges prior to dewatering in sewage treatment. In the food industry, highly viscous products containing fibres or solid lumps are mixed gently and efficaciously. Cleaning in place (CIP) is possible. Even solids such as granulates, pellets and powder can be mixed in-line homogenously, in free fall, despite widely varying bulk densitites.

For further details contact Sulzer, CH-8401, Winterthur, W. Germany.

NEW POLYBUTADIENE RUBBERS FOR TIRES, IMPACT PLASTICS

Polysar has announced it will bring on stream at Polysar Gulf Coast Inc., Orange, Texas, U.S.A facilities to produce two new types of polybutadiene rubbers. When modification work is completed later this year, the plant will have an initial capacity of 25,000 metric tonne Approximately 50 workers will sta the unit.

The updated facility will compl ment Polysar's existing ster specific rubber units in Orange ar Sarnia, Canada, which present produce high-cis polybutadiene (BF for tyres, sporting goods, industri molded articles and polystyren modification.

The two new types of polybuta diene rubber will be manufacture using a lithium catalyst. They will b known commercially as POLYSA VBR 40, a medium-vinyl BR rubbe designed primarily for use in tyr tread compositions, and TAKTEN 550, an impact modifier for polysty rene plastics.

POLYSAR VBR 40 has successfully undergone testing by a numbe of tyre manufacturers. The rubbe offers a superior balance of properties that result in tyres having low rolling resistance and good tractio without sacrifice to other key perfor ance requirements, particularly treadwear. For the motorist, this means fuel economy coupled with increased safety when driving.

The unique composition of POLYSAR VBR 40 rubber is covered by a patent. TAKTENE 550, the second polybutadiene rubber to be manufactured in the modifited plant, will allow the company to better serve the growing needs of the plastics industry. Polymers of this type account for about 50% of the total polybutadiene usage in North American polystyrene manufacture.

The new polybutadiene rubber is suitable for use in the manufacture of various impact polystyrene grades. It complements TAKTENE 1202 which has been made by the Polysar Group as an impact modifier for polystyrene for almost 20 years.

HE NEW HIGH-PRESSURE PUMP GENERATION FROM SULZER

Like their reciprocating counterparts, centrifugal — such as those of barrel casing or axially split design — and also stagecasing pumps have maintained their significance for special applications in process engineering over a period of many years. However, the call for improved economy of operation has led to increased delivery capacities and higher pressures.

The new Sulzer concept, which is based on the hitherto successful high-pressure programme, has been further developed in the interests of

-- improved reliability of operation
-- greater versatility
-- higher economy of operation, and
-- better as well as easier maintenance.

The development of this new generation was not only a question of finding the best-possible hydraulic layout. On the contrary, it was also necessary to integrate all the economic boundary conditions expressed by the operator into the concept. That is to say:

-- minimum energy requirement
-- reduced maintenance costs
-- low capital investment
-- reduction of costs for auxiliary and operating equipment
-- shorter delivery dates and small stocks of spares.

In comparison with the hitherto type series, this global economic consideration, i.e. with regard to design and hydraulics, has produced impellers with higher specific speeds and thus pumps with a larger number of stages and greater efficiency.

In addition, the number of components has been reduced by up to 40%. And to comply as far as possible with individual customer requirements for Q, H and efficiency, impellers with different outlet widths and the associated diffusers are now available for every type size.

The new concept for high-pressure stage-casing pumps provides for discharge capacities of up to 800 m³/h and pressures of up to 350 bar.

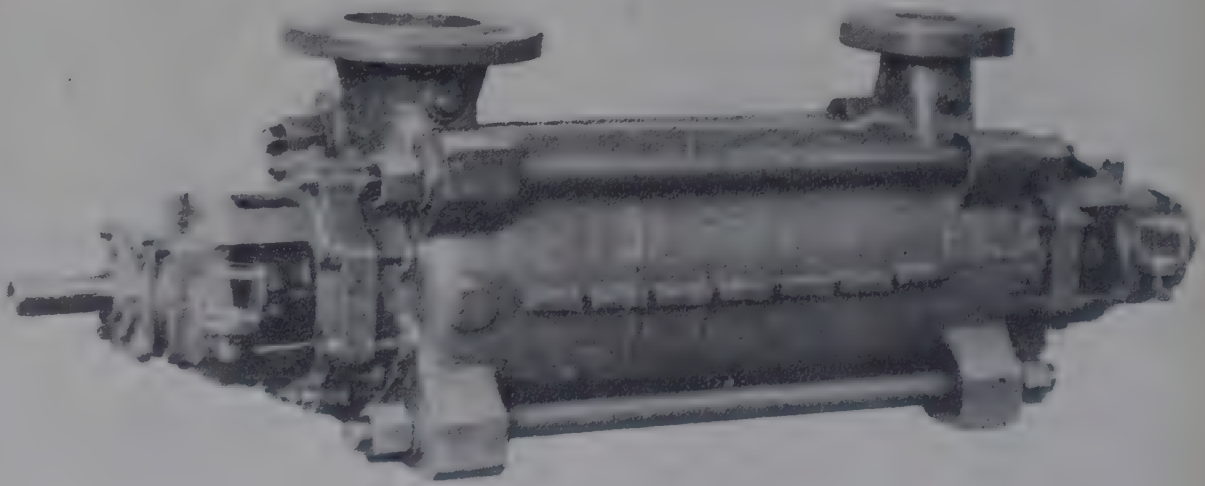
Pump component quality has also been markedly improved. For example, forged suction and pressure casings and, in some cases, also forged diffusers are now employed.

These high-pressure pumps of modular design are additionally characterized by their

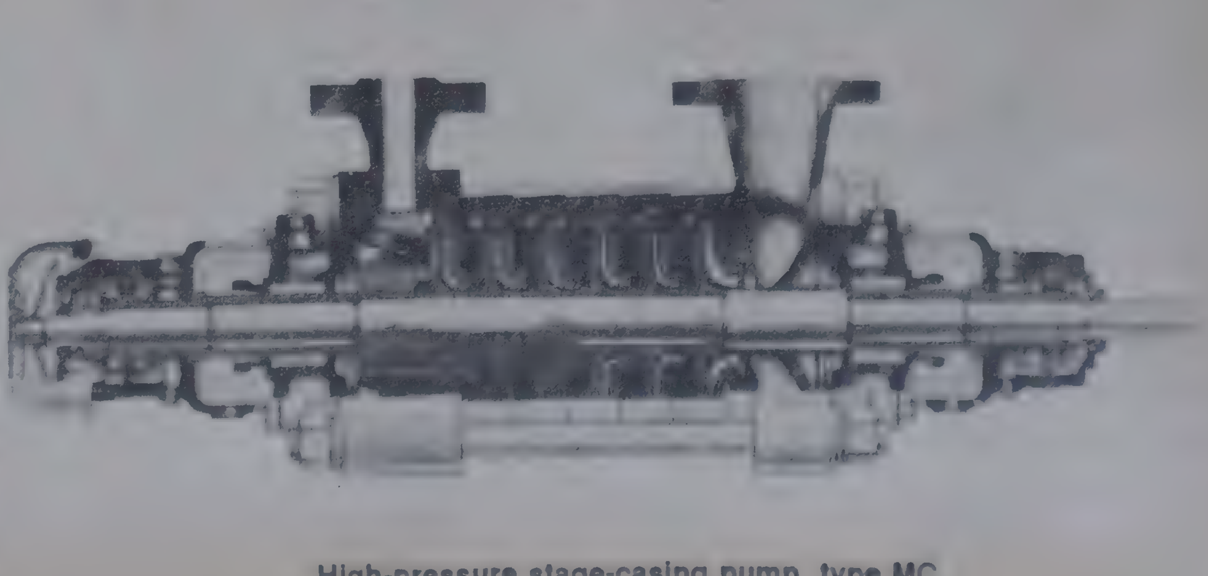
-- greater permissible branch loads
-- higher operating temperatures and reduced consumption of cooling water
-- higher operating pressures
-- better, corrosion-resistant materials
-- shaft seals with almost no leaks (to protect the environment)
-- same hydraulic design for different pressure stages, and the
-- interchangeability of various components and assemblies for the individual type series.

The range of application also includes the process engineering and energy sectors (e.g. power station engineering and energy recovery).

For further details contact : M/s. Sulzer, CH-8401, Winterthur, West Germany.



High-presure stage-casing pump, type MB



High-pressure stage-casing pump, type MC

CARBON BLACK, WHITE FILLERS AND REINFORCING ADDITIVES

Degussa AG of Frankfurt am Main (Federal Republic of Germany), have introduced Carbon black EB 501, a newly developed special-purpose type for UHF-vulcanized injection moulded sections with improved properties. It facilitates accelerated energy transfer during vulcanization, thereby increasing the plant's throughput. This advantage applies equally to technical moulded items, where the blanks are preheated. Another new product in the range is the furnace carbon black Corax N 356. Its surface is comparable with N 375/N 339, but with an extremely complex structure, making it suitable for new applications in tyres and for technical rubber articles. Degussa has recently taken over the sale in Europe of thermal carbon black N 990 from the Huber Corporation (USA). Due to its "soft character", this carbon black is extremely versatile, finding use in particular for technical rubber articles. Degussa has also acquired from Huber the sales rights for the IRB 6 reference carbon black, which is used in testing technical rubber carbon blacks.

Degussa AG, which has recently strengthened its worldwide lead in the white filler sector by expanding its capacity in Taiwan and engaging in a joint venture in India, is exhibiting the white fillers Ultrasil VN 3 and VN 2. These well-known silicas are supplied both as powder and granulate. Further exhibits from the precipitated products range are the medium-active silicas Durosil and Extrusil. Extrusil is used to replace up to 30% titanium dioxide in white and coloured rubber mixtures without reducing the degree of whiteness. Because of Extrusil's low specific weight and its significantly lower price compared with titanium costs can be achieved. Finally the reinforcing additives include Silan Si 69. Among the new applications for this special product are bushings subject to high dynamic stresses, shock absorbers and spring elements.

For further details contact : Degussa AG, Public Relations Department, Postfach 1105-33, D-6000 Frankfurt 11.

NOVEL XNBR COMPOUNDS FOR ENHANCED PROPERTIES

Although carboxylated nitrile rubbers are well known, they have recently been receiving more attention in the rubber industry. For this reason, there evolved a need for improved compounds which would enhance the inherent physical properties (oil and thermal resistance, strength, hardness) of carboxylated nitrile rubber (XNBR) vulcanizates.

To meet these needs, Polysar scientists have developed a variety of novel compounds. G. Colin Blackshaw is credited with an unusual XNBR that can be used advantageously in the production of O-rings, gaskets and abrasion resistant rolls and sealing elements.

Specifically, the improved vulcanizates are derived from compositions which include, as a plasticizer, an epoxidized hydrocarbyl compound (for example, epoxidized linseed oil, epoxidized soybean oil). They have higher tensile strengths and lower compression set compared to vulcanizates containing conventional plasticizer such as di-octyl phthalate. This invention is fully described in U.S. Patent 4271 052.

Another Polysar innovation is a vulcanizable rubber composition consisting of carboxylated nitrile rubber, nylon, a metal (Li, Mg, Ca or Zn) halide, a metal (hydr)oxide and

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described in U.S. Patent 4 5
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describes this invention.

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Chemical News From Abroad

DOW, REPSOL EMERGE AS FRONT RUNNERS FOR EPSI

Dow Chemical and Spain's Repsol appear to be the two main contenders to buy the Portuguese ethylene and polyolefins complex at Sines when it comes up for sale in the near future. Dow has confirmed that it has been in discussion with the Portuguese authorities for some time and says it is "still part of those discussions".

The debt-ridden complex was recently reorganized and placed under one board, headed by Jorge Goncalves, president of polyolefins firm, EpSi, effectively killing off the old Companhia Nacional de Petroquimica (CNP) which operated the cracker.

The upturn in the petrochemicals business has turned around the fortunes of the Epsi group, which last year was threatened with closure after running debts of Esc211bn ($1.6bn) and absorbing Esc79bn of state money.

Private companies have already been invited to bid for the state's shares in Epsi and the Portuguese government is also planning to hand over management of the former CNP cracker to the successful Epsi bidder.

A revision of the Portuguese constitution is needed for the plan to go ahead. Later this month, the government is meeting to consider a proposed amendment allowing private enterprise to operate the basic chemical industry, with little opposition expected.

In recent months the list of suitors for Epsi is rumoured to have numbered around 20. But the main serious contenders appear to be Repsol, the Spanish state oil and chemicals group and Dow Chemical, which already has extensive operations in Spain and needs to secure an additional ethylene source locally. Repsol is already a net ethylene buyer in Spain, and although Dow is debottlenecking its cracker at Tarragona, to an eventual 450,000 ton/year-plus by 1991, it needs more capacity. This is mainly because it is building a new 150,000 ton/year **Dowlex** linear low density polyethylene plant at the site as well as debottlenecking other plants.

Other companies known to have expressed an initial interest in Epsi are Italy's Enichem and several of the Japanese trading houses which buy olefins for export to the Far East. Neste, which has a naphtha processing deal with CNP, was expected to bid but seems to be concentrating on its new Finaneste cracker being built with Petrofina at Antwerp.

France's state owned CdF Chimie holds a minority share of around 15 per cent in Epsi but is unlikely to bid for more. It is currently locked in a legal battle over the right to export its share of the output from Sines.

COOKSON EYES JOHNSON MATTHEY

The UK's Cookson Group has built up a 6.3 per cent stake in fine chemicals-to-precious metals firm Johnson Matthey, leading to speculation that it may be seeking control of the company.

The two undoubtedly have complementary product portfolios, including speciality chemicals, ceramics, colours and printing and precious metals.

Cookson, however, said the $32.2m ($54m) purchase of 10.9 m shares was a "strategic investment" and would not comment on whether it was looking to build further on its initial stake. A spokesman at Matthey said the company was considering what action it should take, if any, on Cookson's move.

Observers said Cookson may be looking to negotiate with Charter Consolidated for its 37.8 per cent stake in the precious metals and catalytic systems group; possibly leaving Charter with Matthey's platinum business. But Charter said recently that it had not been involved in any discussions with Cookson relating to the sale of its stake in Johnson Matthey.

If it goes for a bid, the industrial materials group will be strengthening its operations in a number of areas including products and technology.

Cookson is seen as being readily able to raise the necessary cash — around $600-700m — for a full bid. The group reported sales of $1.2bn in 1987, with operating profit at $154m.

Acquisitions have played a major part in past efforts to strengthen Cookson's position in specialist industrial markets so an all out bid for Johnson Matthey cannot be discounted.

NESTE TO ESTABLISH BRUSSELS OFFICE

Neste is planning a major move of personnel into Brussels as part of its push into continental Europe. The company is planning to set up a technical services centre staffed by between 50-80 personnel, some from its offices in Finland and Sweden.

Starting from September a number of marketing people, probably to handle plastics sales, will also be relocated to the Brussels centre. The offices will be fully staffed at the end of the year when "all our plans are completed" said Jukka Viinanen, executive vice president, chemicals.

By September, Neste expects to select process technology for a major new polyethylene plant it intends to build in Belgium. The 200,000 ton/year facility will be built either at Antwerp or, more likely, at Beringen, the site of the company's polypropylene operations. A site study is currently being carried out. Union Carbide's **Unipol** process, already used in Neste's Swedish plant, has emerged as the firm favourite.

HUNTSMAN PLAN

Huntsman Polypropylene Corp. of the US is to expand its existing PP facility and build a new unit to increase total capacity to 325,000 ton/year.

About 34,000 ton/year of capacity will come from incremental increases or debottlenecking at the company's Woodbury site, where the new facility is also likely to be located.

Huntsman Polypropylene was formed in January 1988 through the acquisition of a Shell PP facility.

The company's board of directors also approved a project for upgrading propylene facilities and to increase raw materials supply flexibility.

Huntsman Polypropylene is an affiliate of Huntsman Chemical, the largest polystyrene producer in North America. Huntsman will also construct a new polystyrene line at Belpre, Ohio as part of its previously announced 91,000 ton/year PS expansion in the US. The new facility will produce 32,000 ton/year.

STERLING TAKES STAKE IN KOPPERS CHEMICAL

An investor group comprising former management and the Houston-based leveraged buyout specialist, Sterling Group, is to pay $660m for the coal tar chemicals business belonging to the Koppers group acquired last month by UK firm Beazer. The company will be known as Koppers Chemical Co (KCC). The deal is to be concluded by August 5, 1988.

Gordon Cain, chairman of Sterling, will head the group and his company will hold a stake of between 20-30 per cent in the business.

The deal marks a major diversification for Sterling which has previously concentrated on commodity chemicals. Most of these operations were sold recently for $2.2bn to Occidental Petroleum, although the company still retains its polyester fibre plants, acquired last year from Hoechst Celanese, and the styrene business previously owned by Monsanto.

According to the company, there are no plans to sell these operations at present. However, Sterling's Robert Santoski said that further forays into the chemicals sector are likely to centre on specialities because "we think many of the opportunities in commodities are past."

Santoski commented that his group sees its investment in Koppers as a longer term prospect than its dealings in the commodities sector, probably lasting at least five years.

Koppers Chemical is made up of six divisions, with products based mostly on coal tar derivatives and related products. In all, it has 31 manufacturing facilities, sited throughout the US i concentrated mainly in the no east. Sales of the company predicted to be in excess of 700m in its first year of ope tion and all divisions are said be profitable.

In the 12 months to Septe ber 30, 1987, sales of Koppe chemicals businesses contribut roughly 50 per cent to the tot turnover of $1.42bn but only per cent of a total operating pr fit of $156m. Santoski ho ever, is confident for the futur The company is already perforr ing better than expected ar comprises "a good, solid set businesses."

The Sterling executive sa there is a significant amount investment going into the con pany, concentrating on produ tivity improvements and produ development. He points to the in stallation of cogeneration facil ties which has already been p in motion, and says the compan is looking to launch some ha a dozen products this year an next.

AKZO IN FULL BID FOR PROCOLOR

Dutch Chemicals major Akz is negotiating for full control o Spanish coatings manufacture Procolor. The company is currently equally owned by Akzo an Madrid-based Uralita.

Akzo acquired its 50 per cen stake in Procolor in 1986 whe it took an option on the remaining shares in the company. Th Dutch company hopes to complete the deal early in 1989.

Barcelona-based Procolor is described as Spain's largest coatings manufacturer with sales o between Dfl. 150-200m ($73-98m). The company's produc e, said to be a good fit with 's, includes industrial coat- , trade and decorative paints, is sold mainly to the domes- narket. It has around 825 em- yees.

kzo has earmarked the coat- s sector as one of its main as for future expansion, toge- r with speciality chemicals l pharmaceuticals. Sales of coatings division account for und 16 per cent of total turno- r which, in 1987, was Dfl. .5bn.

Akzo has coatings subsidiaries sed in Western Europe, Nor- and South America, Africa and ia. As a global player, the com- ny says it is among the leaders.

Meanwhile, Akzo says its joint d with West Germany's Kali hemie for French sulphur pro- ucer Societe Europeenne de ufre Industrial (Sesi) has been uccessful. At the moment, the artners hold around 80 per cent f the shares in the company. he bid, for full control, was va- ued at around $5m.

AF CHARGES

GAF Corp, two of its subsidi- ries and vice chairman James herwin have been indicted by a JS grand jury on 10 charges of lleged manipulation of the Uni- n Carbide share price through US broker, Jefferies, in October 986. The charges include cons- racy, stock manipulation, and ire fraud.

GAF sold its shares in Carbide fter an abortive takeover bid in 1985.

If proved guilty, Sherwin could face up to 50 years imprisonment and a $2.5m fine. GAF and its subsidiaries, if convicted on all counts, could face fines of up to $5m each. Jefferies' chairman has already pleaded guilty to a separate insider trading charge on which he is awaiting sentence.

This latest development could affect GAF chairman Samuel Heyman's plans for a leveraged buy-out of the company.

DU PONT EXPANDS IN JAPAN

Du Pont has announced plans to triple capacity for Kapton polyimide film at Du-Pont-Toray Co Ltd, a joint venture with Toray Industries of Japan. Construction will begin shortly and start up is forecast for the beginning of 1990.

The $50m expansion will increase capacity in Japan to 563 ton/year to support the Japanese polyimide film market which has been growing rapidly for several years, according to Du Pont. It will increase worldwide capacity for Kapton to over 1590 ton/year. Du Pont also manufactures Kapton at Circleville, Ohio, and Bayport, Texas.

Growth of the worldwide polymide film market has been driven by strong demand in electronics, principally in flexible printed circuit applications, as well as the military-aerospace and automotive markets.

The Du Pont-Toray joint venture to manufacture and market Kapton in Japan was formed in 1984. Initial production at the Tokai, Japan, plant began in 1985.

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Chemical Markets Abroad

TEMPORARY ACRYLO GLUT WEAKENS EUROPEAN PRICES

Acrylonitrile producers in Western Europe have enjoyed a buoyant market for the first half of the year, but now the bubble seems to have burst as a glut of product and a lose market means margins have tightened. Third quarter European prices have yet to be settled, although prices seem set to fall marginally to DM1,500-1,550/ton.

While the short term European acrylonitrile position is under some pressure, the long-term situation promises a more rosy outlook. Worldwide demand is set to rise by between 2-3 per cent, although strong growth areas such as the Far East can expect growth up to 5-7 per cent.

One reason being aired for the downturn in the European acrylonitrile market, is that most plants were able to run at capacities of 90 per cent and above this year. Thus, the high level of product which reached the market has allowed customers to build up stocks.

With the summer lull beginning to take effect, all major producers have taken the opportunity to put plants down for maintenance or debottlenecking. This has seen acrylonitrile production in Europe drop by over 10 per cent in the last few weeks. Debottlenecking at two BP plants is estimated to increase capacity by 70,000 ton by mid-1989.

The weaker dollar has allowed the US and countries with linked currencies to view Europe as a potential export market for acrylonitrile and acrylic fibres. As the dollar recovers then this threat should recede and European producers will attain a more favourable position.

The growing demand for acrylonitrile butadiene styrene (ABS), gives further substance to the long-term growth possibilities of acrylonitrile. ABS is still second to fibres as a downstream user of acrylonitrile, though its expanding potential means demand will continue to rise. Product development has allowed ABS to make further inroads into the automotive, telecommunications and small applications industries.

Far Eastern growth is where most optimism is expressed about the future of the acrylonitrile industry. With third quarter prices being set as high as $870/ton & growth being projected at over 5 per cent/year most producers see a good future in this region. Producers now take a worldwide approach to the acrylonitrile markets, while the US and Europe are viewed as being "stable and mature", product produced in these areas can easily be transported to the Far East, which still has rising demand.

Eastern bloc countries are now more involved in the acrylonitrile market as both producers and buyers of acrylic fibres. In the long term these countries will hope to exploit the potential in the European and Far Eastern markets. At present they are forced to import acrylic fibres, to cover their textile manufacturing needs.

WEST GERMAN OUTPUT UP

Output from the West German chemical industry rose by 6 per cent in the first half of 1988, according to figures released by VCI, the German chemical industry association.

VCI president, Helmut Sihl said that chemical sales had sen by 7 per cent and expor were up by 10 per cent on la year's figures. However, the we ker dollar had allowed imports flow into West Germany, esp cially commodity chemicals.

With the summer lull havi little effect on production figure annual growth is being estim ted at 4-5 per cent. If the We German economy continues to b marked by a strong upward tren then capital spending can be ex pected to rise. Investment in ne plant expansion and rationaliz tion could be up 10 per cent o 1987.

Criticism has been levelled a the West German government b VCI, because of the time taken t process applications for ne plants. More legislative contro have also darkened relationshi between the government and che mical industry. VCI delegate condemned a recent environmen tal law which makes testing o new products for environmenta compatability obligatory. Chemi cal producers feel more effor should be directed towards de veloping voluntary agreement such as those signed on cu backs for CFC's.

UREA START UP

Montedison subsidiary Agri mont has started up a 560,00 ton/year urea plant at Ferrara Work started last September t install new energy saving technology at the facility.

Tecnimont, Montedison's engineering unit, carried out the re vamp which cost something under L20bn ($14.8m).

Agrimont has already installed similar technology at one of its San Giuseppeal Cairo plants and chnimont is providing basic gineering and know how for a 7,500 ton/year facility in Luz-u, China. Negotiations are also ng held for additional con-cts.

EXACO RESTART

Texaco Chemical's 470,000 n/year ethylene cracker at Port rthur in Texas, which was knoc-ed out by an explosion on June 4, is now expected back on stre-m by the end of the month.

The explosion damaged a team turbine in a propylene compressor, and a Texaco spokesman said that repairs were due to be completed in late July. In the meantime Texaco has suspended deliveries of ethylene, and also ethylene oxide and ethylene glycol produced at nearby Port Neches, although it has resumed supplies of chemical grade propylene from storage.

Texaco's main merchant buyer of ethylene from Port Arthur is Solvay's Soltex Polymer which has hdPE plants at Deer Park. The company has put polyethylene on 70 per cent allocation following the loss of ethylene supply from Texaco.

ETHYLENE SUPPLY SHORTFALL SENDS PRICES SOARING

The second quarter of 1988 has been a problematic one for ethylene players on both sides of the Atlantic. The market has been dominated by acutely tight supply on the back of widespread plant problems which has sent prices sharply upwards.

Central to Europe's supply problems was an interruption in production at the Ras Lanuf cracker in Libya, the major supplier of deepsea liquid ethylene to North West Europe. Around 90,000 ton of material from the cracker had been expected in Europe during the first half of the year.

However, a maintenance turnaround at the plant which started on April 6 and had been scheduled for one week eventually took six weeks or so. Subsequent problems at the loading terminal delayed lifting until June June 13. As a result, the Libyans are still trying to clear order backlogs, and no spot material is expected to be on offer before the end of August.

The problem of availability of product for European buyers in the Mediterranean has been further exacerbated by the lack of material from Algeria and the Middle East.

Problems at the Algerian cracker have reduced shipments from an expected 10,000 ton to less than 5,000 ton, and no material at all has so far been seen from Saudi Arabia and Qatar, with the Far Eastern markets proving more attractive.

With a spate of unplanned cracker shutdowns over the past month — the ROW G4 cracker and CdF Chimie/Norsolor's unit at Wesseling, in West Germany at Dunkrik — the ARG pipeline has become extremely congested with customers, pushing the price for small spot deliveries to DM1,100/ton.

The tightness in Europe's ethylene market has had a significant knock-on effect on contract prices, with producers and buyers alike conceding that ethylene has been undervalued in NWE compared with the rest of the world and with current derivative prices. A substantial increase has been achieved on Q3 contracts, taking levels to DM890-930/ton delivered, around DM100/ton ahead of the second quarter. Certain producers, including Dow and Shell have moved several customers onto monthly contracts.

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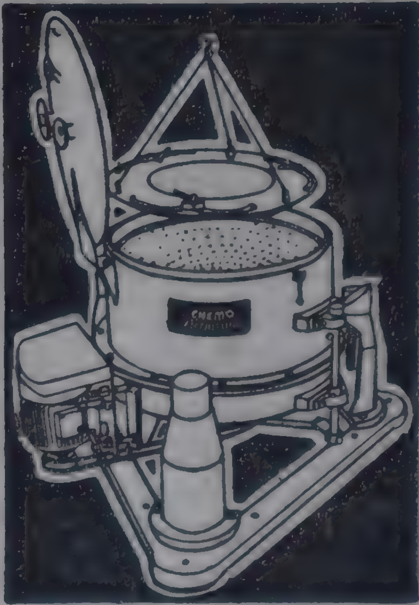

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But despite the short term problems on supply, ethylene production is still on target for a record year. In the first 4 months of 1988, production was up 8 per cent on the year earlier period and is equivalent to 14.7m ton for the whole year against 13.5m ton in 1987.

It is difficult to assess how close to capacity ethylene production is now running, with producers using maintenance turnarounds to demothball plants to gain extra capacity — Exxon's so-called capacity creep — not all of which is publicized. David Glass of consultant Chem Systems, estimates that capacity creep could eventually add 800,000 ton/year to capacity in Europe by 1990. Exxon's figure is nearer 1m ton.

In addition, some more substantial expansions are currently under consideration. Statoil is considering a 10-15 per cent expansion of its 365,000 ton cracker at Stenungsund by adding a new furnace which would add 260,000 ton/year to capacity.

Meanwhile, the US ethylene market has also come under pressure after some serious supply interruptions. The explosion at the Shell Norco cracker and more recently at Texaco's plant at Port Arthur have sent shockwaves through the market.

The situation has prompted a flurry of activity amongst producers, with a number of plans announced for ethylene expansions, demothballing programmes and cracker newbuilding. But significantly, the situation has rekindled interest in an ethylene terminal in the US Gulf.

The US currently has no facility to import liquid ethylene, and a number of producers, including Exxon, Union Texas and Chevron are believed to be considering construction of a terminal expected to cost in the region of $20-30m. Previously US prices had been too low to make a terminal economic, but with July contract postings expected to be at least 30 cents/pound ($660/ton), observers believe that such investment could pay off.

But the plans are meeting some criticism, with some observers arguing that there is little chance of regular import supply for at least two years. Far East prices, currently at around $700/ton cif are attracting any spot availability from the Middle East and with only Libya putting significant volumes of liquid ethylene onto the merchant market, political considerations would prevent material from being imported to the US.

World ethylene consumption (m ton)

	1986	1990	1995	Growth (per cent/year)
West Europe	12.6	13.9	14.3	1.2
North America	16.7	19.4	21.5	3.1
Rest of world	16.9	21.0	26.6	5.2
Total	46.4	54.2	62.8	3.4

Source: Chem Systems

LIBYA, SAUDI ARABIA LOSE GSP BENEFITS

Methanol Originating from L
will be excluded from any ta
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1989. In addition, seven pr
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scheme. The changes occur u
er a technicality clause incor
ated into the GSP system 1
years ago. It states that if ex
ing quota allowances are subst
tially exceeded they will be h
ved the next year and then los
The controversial GSP allc
ances are renewed each year a
the proposals for 1989 have
cently been finalized by the E
commission. The products fr
Saudi Arabia that will be affe
ed inculde methanol, lldPE,
PE, melamine, ethylene gly
and styrene.

The EEC is currently involv
in sensitive discussions with t
Gulf cooperation council (GC
over an "expanded trade agre
ment" with Arab Gulf states. Th
GCC is seeking a total free tra
agreement with the EEC and
particularly keen to seek du
free entry for petrochemical pr
ducts, mainly from Saudi Arabi
The European chemical indust
is equally keen that this do
not happen and is still hopin
that any trade agreement w
not involve too much relaxatio
of current duties on chemicals

A first stage expanded trad
agreement was signed on Jun
16, leaving the EEC with an ob
ligation to move towards a se
cond stage.

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Environment

EEC ACTS ON ILLEGAL WASTE EXPORTS TO THIRD WORLD

Despite the failure of European environment ministers to agree on the regulation of toxic waste exports to developing countries at the recent environment council meeting in Luxembourg the commission has announced initiatives to control the shipment of these dangerous cargoes.

The commission believes a large proportion of waste exports to developing countries are in breach of community rules of human health and environmental protection.

Community exporters of toxic waste are already expected to comply with council directives 84 631 and 86 279, which say that appropriate authorities should be informed about the toxic exports and that authorization of shipments should be proved.

The commission says it has information which shows that these directives have not been met with contracts for the export of very large quantities of waste to a number of African countries. These countries do not possess the necessary technical capacity to deal safely with the type of waste concerned.

To improve the situation the commission wants to incorporate the two directives into the member states' law as quickly as possible. Belgium, Greece and Denmark have already enforced the directives but it could be months before the whole community is agreed. In line with this, the commission expects to establish more precise definitions of hazardous [illegible] atment methods and information requirements. Further legislation is also being mooted.

Meanwhile the commission says it could use article 113, on commercial policy, and article 130, on environmental protection, to regulate dangerous waste exports. It is possible that operators in breach of this legislation could be taken to the European court of justice.

An observer of the waste disposal industry, says the shipments of toxic wastes to developing countries highlight the lack of disposal capacity in Europe. One European contractor claims to have orders for the transport of 100m ton of hazardous waste over the next 10 years. The observer warns that legislation will not be enough. A waste registration system is needed to monitor the production, transport and disposal of all toxic wastes. One problem, he claims, is that some waste can pass through several companies making it difficult to determine the original producer.

The environmental pressure group Greenpeace, estimates that Western industrialized countries export 20m ton/year of toxic waste to the developing world. The group has issued an inventory of international waste trade, listing 116 exports of hazardous waste from Europe and the US to Africa, as well as movement to the UK, between US and Canada and from the US to Mexico, Latin America and the Caribbean. Greenpeace claims the flow of waste from industrialized countries is a result of a [illegible]

Meanwhile, West / cers have said they w gal steps to halt the fl and nuclear waste bei in the area.

BAYER UK OPENS SI WAREHOUSE

Bayer UK has spe ($2.5m) on a new next to existing storag at its Stoke Works sit mingham. The build will house hazardous only, is specially equip variety of safety meas gned to insure against ble accident.

Some $300,000 of th $1.5m has been channe health and safety areas, as environmental facilit include automatic foam, air vents and a 3 wall separating two sec the warehouse.

BASF COOPERATES O DISCHARGES

BASF has decided to Dutch authorities info which chemicals it is d the Rhine. The Germar association VCI, says it recommends that compa open about their disch the Rhine, which is an source of drinking wate Netherlands. BASF s chemical companies are to give this information environmental pressure will misuse it.

BASF may face a bill Dfl 900,000 ($400,00 Dutch water companies have to remove bentaz drinking water. The company produces the at Ludwigshafen. It is [illegible]

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NEWS FROM JAPAN

Basic R & D. Partnership with other Sectors to be Vital: MITI

The Ministry of International Trade and Industry (MITI) compiled a report in early June discussing how the Japanese chemical industry should be steered to cope with its new environment, which will be characterized by "hybridization" in the 21st century. Hybridization here means the combination of existing chemical technology and other types of technology in such a way that a variety of new technological systems can be produced.

To this end, the report points out that it is necessary for the chemical industry to enhance in a serious manner R&D strength, particularly basic research, strengthen partnerships with different industries including user industries, increase efforts to grasp users needs and promote international business operations. In addition it stresses the necessity for the government to improve the environment related to basic research with regard to both equipment and programs.

The report was released as an interim one by the advisory panel to the director of the Basic Industries Bureau of MITI after discussions and examination of the problems involved at meetings held on five occasions since last November.

The Panel is intended to indicate the form the chemical indus-

restructuring of Western chemical businesses, development of Asian NIEs (newly industrialized economies) and movement of Japanese manufacturing plants to overseas countries etc., while taking the view that the chemical industry will have a greater role in manufacturing industry in future.

It is the first time MITI has presented such a report on the chemical industry. The report refers to the growing importance of the shift to fine chemicals and specialities, more accurate appreciation of user needs and business deployments carried out from a global point of view. In particular, it stresses the necessity of creating needs themselves.

To push forward basic research by the industry, the report also points out the necessity of collaboration among the industrial, academic and government sectors in such a way that comprehensive research can be made from the start of basic research to cover the different types of technology that may be combined with chemical technology. On the part of the government, it is recommended that greater efforts should be made to establish an evaluation system for physical tests of materials, provide the data bases required and realize international adjustment of intellectual-property protection systems, in addition to taking mea-

Japan, U.S. Firms Tie up for Thermoplastic Polyolefin Business

Asahi Chemical Industry C is scheduled to start marketi this fall thermoplastic polyole (TPO) — modified polyprop lene comprising polypropyle (PP) and ethylene — propyle (EP) rubber — imported fro Dexter Corp.

To this end, the Japanese co pany has concluded a cross- cense contract with the U.S. co pany. In accordance with t contract, the former is suppos to obtain from the latter TF production technology, exclus production/sales rights for t product which are valid only Japan — and nonexclusive sal rights for it — effective throug out the world excluding the U and Canada. The Japanese co pany will license the U.S. co pany production technology f an additive designed to ma TPO much more paintable.

Dexter's TPO is available two types — versatile and pai table types. Asahi Chemical dustry will start importing 5 tons of the product this fall a increase the sales ratio of t paintable-type product in futu It aims at domestically produ ing 3,000 tons year of the pr duct, thus attaining sales of 1,200 million in fiscal 1990.

The two companies have a reed to jointly exploit TPO m kets in the States and Japan a establish a system for supply products having unified brand r mes and grades throughout t world. They thereby intend supply Japanese auto maker w the product in any part of t

TPO is used in auto parts in-uding bumpers. Japanese de-nd for the product last year estimated at about 60,000 s and the growth rate concer-d will show a double-figure owth rate this year. Dexter has pplied TPO to the big-3 U.S. r makers and Japanese-capital nes.

demitsu Boosting styrene perations at home $ abroad

Idemitsu Petrochemical Co. is scheduled to complete scaling up of styrene operations from the end of this year through next. The company will complete at the end of this year the construction work needed for resuming operation of an idle 100,000-t/y styrene-monomer (SM) plant, which will be put into commercial operation next March.

In Malaysia, it will scale up the production capacity of HI-type polystyrene from 30,000 tons a year and complete a 5,000-t/y foamed-polystyrene plant: the revamped and new plants will be put into operation at the end of this year.

In addition, Kaofu Chemical Corp. (Taiwan) 35% owned by the Japanese chemical company, is to increase its polystyrene production capacity from 50, to 70,000 tons a year this October.

Demand for styrene products including polystyrene and ABS resin is expanding both at home and abroad. In Southeast Asia, in particular demand is rapidly growing for use in cassette-tape recorders and other household electrical appliances.

Styrene monomer has been in short supply throughout the world. The shortage has become serious due to plant trouble hitting Shell Oil (U.S.) High hopes are placed on resumption of idle plants including Idemitsu's. Styrene products are projected to continue showing high growth rates and Idemitsu Petrochemical envisages taking full advantage of its through-production system covering from starting material to finished products.

Direct Overseas Investment up 49.5% in Fiscal 1987

Japan's direct overseas investment soared 49.5% to $ 33.36 billion in fiscal 1987 ended March 31, the Finance Ministry said.

The fiscal 1987 total, which included the establishment of subsidiaries, aquisition of equity stakes of more than 10% in foreign firms and loans of over one year to foreign companies, followed an 82.7% jump in fiscal 1986 according to the ministry.

Ministry officials said the high level of direct overseas investment by Japanese firms resulted from the stronger yen, which spurred Japanese companies to actively shift their production overseas in an attempt to dodge trade disputes and step up mergers and aquisitions.

The United States accounted for 44.1% of the fiscal 1987 Japanese direct investment, followed by Britain with 7.4% and Panama with 6.9%.

Investment in the manufacturing sector abroad totalled $7.83 billion in fiscal 1987, 2.1 times more than the previous year. Banking and insurance investments jumped 47% to $10.67 billion, while real estate advanced 36% to $5.43 billion.

Meanwhile, direct investment in Japan for foreign companies came to $2.21 billion in fiscal 1987 2.4 times more than the previous year.

Tosoh Buys Sputtering — Target Division From U.S. Company

Tosoh Corp. has taken over the specialty-metal division (annual sales: $20 million; employees: 125) of Varian Associates. Inc (U.S.) at a total cost of about $30 billion. In a related development, the Japanese company is scheduled to establish a U.S. subsidiary July 1st.

The U.S. company — one of the world's four largest producers of sputtering targets — manufactures semiconductor-production equipment, electronics devices, medical equipment and analysis instruments. The said division produces sputtering targets used in semiconductors, hard disks, optical disks and display panels: semiconductor-use products account for most of the division's sales.

Tosoh launched into sputtering target business in 1983 using superhigh-purity chromium as staple material. The company is the world's largest or second largest producer of chromium targets. Its sales of sputtering targets stand at about Y-1,000 million with half the total production exported to the United States.

The Japanese company has yet to commercialize semiconductor-use sputtering targets but the acquisition of the division will enable the company to supply every type of sputtering target and become the world's largest sputtering target producer.

The world market involved is equivalent to Y20,000 million and more than half of it is equally shared by the big-4 producers — Varian Associates, Materials Research (U.S.), Degussa (W. Germany) and Vacuum Metallurgical Corp. (Japan).

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New Developments From Japan

M'shi Chem. To Add New Grade of Liquid Crystal Polymer

Mitsubishi Chemical Industries Ltd., intends to commercialize a new version of its polyester-based liquid crystal polymer ("Novaccurate") within this year. The new grade will have a heat-deformation temperature of 200-270°C, ranking it with the No. 2 type of liquid crystal polymers now available in terms of heat deformation temperature.

Novaccurate is of the No. 3 type featuring lower heat-deformation temperatures in the range of 150-200°C and a lower price It has been used for optical-fiber coating, speaker cones and compact disks, etc., and the company is intent on exploiting new markets by introducing the new-grade product. The No. 1 type features the highest heat resistance of 270-350°C.

The new version having maximum heat resistance of 270°C will compete on the market with a polyphenylene-sulfide resin having heat resistance of about 250°C as well as Sumitomo Chemical's "Ekonol" (270°C) and Polyplastics Company's "Vectra" (230°C).

Nippon Petrochem. Develops Film-use L-LDPE Process

Nippon Petrochemicals Co. has suceeded in developing manufacturing technology for film grade L-LDPE (linear low-density polyethylene) produced by the vapor-phase process. The product manufactured on a trial basis and supplied to film makers in sample form is receiving a good response. This stems from the successful development of a catalyst, the company says.

The company will continue efforts for development of a grade having higher low-temperature resistance. When its manufacturing process is complete, it will decide on a plant-construction plan for the L-LDPE. Considering the development so far achieved, the company is looking forward to starting plant construction sometime in 1990.

Nippon Petrochemicals is co-producing high-density polyethylene and liquid-phase process L-LDPE (NISSEKI RINIREX), with sales of the latter reaching about 15,000 tons a year mainly for nonfilm uses centered on pipes. Demand for L-LDPE has been rising for use as films, replacing LDPE and the company has striven to develop technology for film use L-LDPE.

It is constructing an 80,000-t/y plant for PP together with Mitsui Petrochemical, Mitsui Toatsu and Mitsui Niseki Polymer, and has also been preparing for plant construction for L-LDPE following the PP Project.

Furukawa Develops Titanium Dioxide For Plastics Use.

Furukawa Co. has developed a new grade of titanium dioxide for plastics use and has started production. Following expansion of plant for rutile-type titanium dioxide at its Osaka factory, a supply structure for titanium dioxide for plastics use has been established.

Titanium dioxide for plastics use accounts for only 8% of the titanium — dioxide market, but sales expansion is anticipated by means of branching out into new fields other than paint, a major outlet. The company intends to raise annual sales of its chemical department to Y10 billion.

The firm has just completed expansion of production capacity of 200 tons a month. It reduced production capacity for anatase type titanium dioxide by 50 tons a month and raised that for rutile type titanium dioxide by 250 tons a month. As a result, its production capacity for titanium dioxide for plastic use totals 1,500 tons a month. A plant of this scale has gone into operation.

It has started sample deliveries of titanium dioxide for plastics use. The expansion of the production capacity thic time has made it possible for the company to manufacture titanium dioxide for plastics use for the first time.

Differing from titanium dioxide for paint use, that for plastics use requires surface treatment and unification of granular diameters. The firm will be able to sell on a full scale within this year.

In Japan, production of titanium dioxide for plastics use registers 1,500 tons a month. Accounting for about 8% of the 1,500 tons, anatase-type titanium dioxide accounts for only 300 tons. Thus, rutile-type product occupies the major portion. Domestic demand is growing at over 7% a year.

The company's Osaka factory is the base for its chemicals department, producing titanium dioxide, sulfuric acid and cuprous oxide.

Bismuth-based Superconductive Ceramics Changed into Glass

Professor T. Minami of the University of Osaka Prefecture has succeeded in transforming bismuth-based superconductive ceramics (components: bismuth, strontium, calcium and copper

It is impossible to change bismuth-based superconductors into glass using conventional quenching methods since their viscosity is markedly low when they are molten. He melted the bismuth-based ceramics by means of infrared ray-applied heating equipment and transformed the resultant product into glass using quenching equipment incorporating twin rollers.

The molten material was quenched so rapidly at 10°C/Sec. that it did not crystallize and instead became amorphous. It is possible to heat the resultant bismuth-based glass and transform it into fibre and film, both of which can be changed into ceramics after being heated at about 850°C and thereby becoming crystallized.

The film produced by him through the above mentioned steps achieved complete superconductivity at 85K: it almost completely retained the properties of the starting materials.

It is forecast that bismuth-based superconductors will be put into practical use earlier than yttrium-based ones since the former have advantages over the latter in terms of super-conducting temperature, critical current density, stability and raw material cost.

High-purity Hydrogen made by Gas-separating Film

Ube Industries Ltd., recently delivered a plant for producing high-purity hydrogen to Ube Ammonia Industry Co.'s Ube factory (Yamaguchi Prefecture) and the plant has gone into operation.

The plant can manufacture high-purity hydrogen (99.999%) using gas-separating film for the first time in the world.

Aromatic polyimide hollow film is used for the gas-separating film. As a result, the company has made it possible to manufacture such high-purity gas. So far, it has been impossible to manufacture high-purity gas (99.999%) by using film separation.

High-purity gas manufacture by means of the gas-separating film reduces manufacturing costs. Demand for the film is therefore expected to increase further.

On the basis of the results this time, Ube Industries intends to branch out into the field of gas manufacturing by making active use of gas-separating film.

Mass-Production Method for Prostaglandin Precursor Bared

Lion Corp has established mass-production technology for arachidonic acid a precursor of prostaglandin, an important biologically active substance. The new process is 10 times as efficient as conventional methods the company says.

How to synthesize prostaglandin from linolic acid in metabolic pathway is known, but no mass-production method for the precursor has been developed anywhere in the world. Lion's process is to obtain arachidonic acid at a very high yield by means of mass cultivation of a particular mould in a special condition.

After completing facilities for the refining process, the company will produce the substance in sample form and deliver them to users for evaluation.

Arachidonic acid has so far been derived mostly from lipids obtained from animal adrenal glands and livers but this method offers very low productivity. Other processes using micro-organisms have not been effective either.

Japan-China Firm Aims at marketing Herb Medicines in Japan

Chinese Medicine Development Center will soon be established by Asian Natural Medicine Association (Japan) and a Chinese government department handling pharmaceutical affairs. The joint corporation will be capitalized at Y50 million and owned 51 and 49% by them, respectively. Its head and branch offices will be located in Tokyo and Beijing, respectively.

The company is scheduled to sell herb medicines and medical equipment both imported from China and run a restaurant serving health-care dishes — which were once prepared in the Chinese Court. It will establish a production base in Japan some time in the future. The sales target of the new company is set at Y100 billion a year.

In China, about 3,000 types of medicines (700,000 tons a year) are produced at 600 plants. A total of 5,700 types of bulk drugs are produced there. In Japan, marketing of 210 types of herb medicines are authorized and domestic clinical tests are needed for sale of other ones.

The Japanese market for herb medicines is rapidly expanding and health-care food is enjoying a great boom in this country. Under the circumstances, the Chinese side envisages obtaining foreign currency (Japanese yen) through the joint venture.

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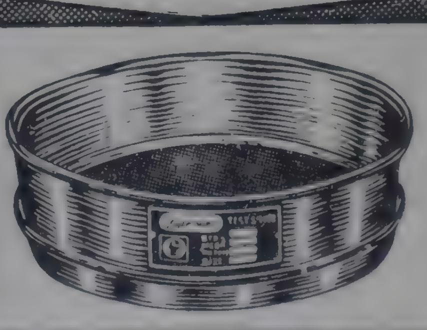

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We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent — and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of market conditions.

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Mercury (75 lbs.)	10500.00
Nickel chloride	90.00
Oxalic acid	(Resale) 22.00
Peppermint oil (Rectified)	90+Ex.+ST
Potassium carbonate (Indian)	19.00
Potassium carbonate (Imported)	23.00
Potassium bichromate	22.00
Potassium phosphate (Mono)	14.00
Potassium phosphate (Di)	14.00
Polyvinyl alcohol (No. 117)	120+ST
Polyvinyl alcohol (No. 173)	(Resale) 135+ST
Polyvinyl alcohol (No. 208)	150.00
Paraformaldehyde (Resale)	20+ST
Phthalic anhydride 36%	(Resale) 24.00
Pentaerythritol	(Resale) 51.00
Paraffin wax	(Resale) 14.50
Rangolite (German)	80+ST
Rangolite (Czech.)	54+ST

Sodium sulphate (Fine)	6.00
Sodium sulphate (Coarse)	5.00
Sodium sulphide 50-52% (Flakes)	11+ST
Sodium sulphide 58-60% (Flakes) (TCL)	19.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale)	700.00
Sodium chlorite 80% (Spain)	90.00
Santobrite (Indian)	36.00
Soda Ash (Tata)	4.00
Soda Ash (Birla)	3.80
Soda Ash (Imp.)	3.50
Sodium bicarbonate	5.25
Sodium bisulphite	4.50
Sodium silicate	3.00
Sodium acetate	6.00
Sodium alginate	150+ST
Titanium Dioxide (Anatase)	50+ST
Titanium Dioxide (Rutile — RCR_2)	70+ST
Tartaric acid (Crystal)	94.00
Trisodium phosphate	4.80
Thiourea	78+ST
Urea (Tech)	2.75
Zinc Dust	30.00
Vacuum salt	1.00
Zinc Oxide	30.00
Zinc chloride powder (technical)	14.00
Zinc sulphate	4.00

SOLVENTS	Per kg.
Acetic Acid (Glacial)	(Resale) 17.00
Acetic Anhydride	(Resale) 25.00
Acetone	(Resale) 16.00
Adipic Acid	55+ST
Aceto Acetanilide	50.00
Aniline Oil	(Resale) 50.00
Benzoate Plasticiser	45.00
Butyl acrylate	88+ST
Butyl stearate	36.
Butanol	(Resale) 35.
Benzyl Alcohol	60.
Benzyl chloride	34.
Benzo trichloride	16.
Benzoyl chloride	22.
Bromine Liquid	42.
Chloroform	25.
Carbon Tetrachloride	17.
Cellosolve	45+
Cyclohexanone	53+
Cyclohexanol	43+
Diacetone	(Resale) 35.
Diethyl Oxalate	34.
Diethylene glycol (DEG)	46+
Dioctyl Phthalate	52.
Diallyl Phthalate	56.
Dimethyl Phthalate	28.
Dioctyl Adipate	52.
Dibutyl Adipate	42.
Dipentene	15.
Dimethylamine 40%	12.
Dimethylamine 60%	14.
Ethyl Acetate	19.
Ethyl Acrylate	54.
Ethylene Dichloride	11.
Ethylene Glycol	45+
Formic Acid (Imp)	(Resale)29.
Formaldehyde	(Resale) 6.
Glycerine (CP)	53.
Glycerine (IW)	48.
Hydrogen peroxide 50%	(Resale) 29.
Isopropyl Alcohol	21.
Iso Butyl Alcohol	28.
	(Resale) 30.
Monoethanolamine	(Resale) 49.
Melamine	57+
Methyl Ethyl Ketone	55.
Methyl Isobutyl Ketone	36.
Methyl Acrylate	42.
Methyl Dichloride (Resale)	23.

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Phone: 7-54. TELEX : 716-213 MORG-IN.

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METHANOL
TOLUENE
BENZENE
XYLENE
ACETONE
FORMALDEHYDE
PARAFORMALDEHYDE
ETHYL ACETATE
n-BUTANOL
CALCIUM CARBONATE

Please Contact :

RAM SHREE CHEMICALS

330, Samuel Street, 4th Floor, Room No. 402, Bombay-400 003.
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For Competitive Import of Pharmaceutical Substances, Chemicals & Raw Materials and Particularly the following items :

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PHERMONES
CARDIAC GLYCOSIDES
ANTI CANCER DRUGS

LITHOPONE
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POTASSIUM & SODIUM HYDROXIDE
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Please Contact Exclusive Representatives of :

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M/s. N. JIVANLAL & CO. PRIVATE LIMITED
Rawat Manzil, 2nd Floor, 50, Shamaldas Gandhi Marg, BOMBAY-400 002.
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ORTHO NITRO BENZALDEHYDE
a-PICOLINIC ACID

Please contact manufacturers :

Trichem Laboratories

11, Lalwani Industrial Estate,
14, G. D. Ambekar Marg, Wadala,
BOMBAY-400 031.
Phone: **4123188/4127568**

Meta Cresol	46 (X)
Nitrobenzene	18.00
Nitric Acid (Con.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol	(Resale) 36.00
Propylene Glycol	41+ST
Polyethylene Glycol (No. 200)	39.00
Polyethylene Glycol (No. 400)	42.00
Polyethylene Glycol (No. 500)	42.00
Polyethylene Glycol (No. 1600)	14.00
Polyethyene Glycol (No. 4000)	38.00
Polyethylene Glycol (6000)	50.00
Para Cresol	40.00
Styrene monomer	50+ST
Sorbitol	16.00
Sulphuric Acid	2.10
Trichloroethylene	28.00
Triethanolamine	(Resale) 49.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	11.75
Triethylamine	50.00
Vinyl Acetate Monomer	43.30

SOLVENTS	Per Litre
Benzene	15.00
N-Heptane	8.00
N-Hexane	8.75
Methanol	8.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	21.00
Xylene	20.00

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

Alphanaphthylamine	60.00
Alpha Naphthol (Imp.)	180.00
Aceto Acetic Ester (Methyl)	60.00
Ammonium Molybdate	200.00
Anthraquinone	100.00
Anthranilic Acid	60.00
2-Amino-4-Nitrophenol (Imp.)	155.00
Blue B. Base (Local)	230.00
Beta Naphthol (Atul)	58.00
Benzidine Dihydrochloride (BDH)	80.00
Bromamine Acid	400.00
BON Acid	118.00
Chicago Acid	280.00
Coach Acid	58.00
C. Acid (Imp.)	260.00
Cyanuric Chloride (Japan)	120.00
2, 4, DNCB	29.00
Dihydrothio PTOS (Imp.)	600.00
Dimethyl Aniline	69.00
Diethyl Aniline	160.00
Di-amino stilbene disulphonic acid	125.00
3, 3-DCB (Imp.)	180.00
Gamma Acid (Atul)	170.00
H. Acid (Atul)	155.00
G. Salt	60.00
Isophthalic Acid	45.00
J. Acid	265.00
J. Acid Urea	290.00
K. Acid	105.00
MDPS (German)	200.00
MNA	90.00
Meta Unido Aniline	155.0
MPD (Local)	150 + EX.+T
MPD (Japan)	210.0
Naphthenic Acid	12.
N-Methyl J. Acid	380.0
N-Methyl Aniline	120.0
Naphthalene (Refined)	23.0
Ortho Anisidine (OA Imp.)	85.0
Ortho Dichloro Benzene (ODCB)	11.2
OT Base	100.0
Para Dichloro Benzene (PDCB)	17.0
Para Anisidine (PA-Imp.)	110.0
Para Anisidine (PA-Local)	90.0
PNA	70.0
Para Cresidine (Imp.)	335.0
Para Amino Azo Benzene (India)	130.0
PNCB	34.0
Para Amino Acetanilide	145.0
1-Phenyl 3-methyl-5 Pyrazolone	120.0
Phenyl J. Acid	345.0
Para Amino Benzoic Acid	170.0
PT Base	88.0
Rhoduline Acid	500.0
Resist Salt	22.0
Resorcinol	145.0
Sodium Naphthionate	65.0
5-Sulpho-Anthranilic Acid	64.0
Sulphanilic Acid	25.0
Sulpho Tobias Acid	115.0
Trichloro Benzene (TCB)	17.0
Tobias Acid	125.0

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(Inquiries for Acetone Cyanohydrine (GUJACH) and Methyl Methacrylate Monomer (GUJMER) for chemical application also solicited.)

Bombay dyes market

(Prices as on 4th August 1988)

ACID COLOUR	Per Kg.
Acid Violet 4BS	143.00
Acid Maroon V	110.00
Acid Orange II	77.80
Acid Orange IIY	63.05
Acid Red A	107.25
Crosein Scarlet MOO	155.00
Acid Scarlet 3R	99.90
Acid Red 38N	135.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Green V	230.00
Acid Patent Blue AS	250.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	121.95
Acid Black BX	98.40
Acid Black Wax	135.50
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

DIRECT COLOURS	Per Kg.
Yellow 3GX	88.10
Gun Yellow RCH	124.00
Fast Yellow GCH	141.15
Yellow CFG Hly. Conc.	312.00
Fast Yellow GS	111.65
Fast Yellow CHRS	95.45
Viscose Orange A	166.15
Fast Orange GR	133.75
Red	96.90
Dark Tan	78.25
Red IIR	72.55
Red 4B	169.10
Bordeaux BW	132.30
Fast Scarlet 4BS	166.55
Red 12B	170.55
Bordeaux Hly. Conc.	194.00
Cotton Red N	117.05
Brill. Fast Helio B	278.00
Brill. Fast Helio 2B	297.00
Brill. Fast Helio 2RS	136.20
Brill. Fast Helio BS	116.10
Brill. Violet Extra	126.40
Blue 2B	86.60
Blue G	170.50
Sky Bue FB	188.25
Copper Blue GR	147.00
Fast Greenish Blue GL	114.60
Developed Black BT	116.10
Blue NB-2B	300.20
Blue NB-2BC	185.30
Developed Black NB-GHB	185.30
Green B	111.65
Green NB-B	188.25
Green 2B-N	188.25
Brown MR	154.40
Brown CN	107.25
Golden Brown G	140.35
Catechin G	120.50
Omega Tan	126.40
Catechin GS	102.80
Black E Hly Conc.	142.60
Black E Extra Hly. Conc.	142.60
Black NB-ER Hly. Conc.	310.50

DISPERSOL COLOURS	Per Kg.
Yellow 6G Powder	143.80
Red B 3B Powder	247.80
Red B 2B Powder	323.20
Red CB Powder	439.15
Red D2B Powder	477.40
Violet C 4R	521.90
Blue BG Powder	235.45
Blue BN Powder	103.75
Blue D 2R Powder	476.25
Navy BT Powder	243.90
Blue B 2G Powder	210.20
Black BT Powder	182.60
Blue BR Powder	390.20
Yellow 7GL	338.60
Yellow 5RX	218.80
Yellow 3G	367.25
Yellow	140.00
Yellow AL	135.30
Yellow Brown REL	247.50
Yellow FFL	463.60
Gold Yellow GG	259.70
Pink REL	247.00
Red REL	468.65
Red 2B	327.40
Red FB	324.20
Red Violet FBL	469.85
Orange 3R	196.65
Violet 3R	280.00
Violet RL	275.45
Violet 6R	485.75
Scarlet RR	214.8
Rubine 3B	223.0
Rubine CB	364.9
Blue GL	318.9
Blue BGF	636.5
Navy Blue RF	270.4
Brown 3REL	200.4
Black GEL	324.2
Dark Brown 3B	317.4

BASE COLOURS	Per Kg
Fast Yellow GC	80.2
Fast Orange GC	135.4
Fast Scarlet R	166.90
Fast Scarlet RC	126.65
Fast Scarlet RCR	99.05
Fast Scarlet G	121.65
Fast Scarlet GN	91.50
Fast Scarlet GG	72.70
Fast Scarlet GGS	72.75
Fast Red B	203.20
Fast Red RC	119.15
Fast Red R Flakes	149.25
Fast Red TR	166.80
Fast Red TR Oil	183.15
Fast Red RL	237.10
Fast Red KB Oil	201.90
Fast Bordeaux GP	201.95
Fast Garnet GBC	94.00
Fast Violet B	505.60
Fast Blue BB	521.40

NAPHTHOL COLOURS	Per Kg.
ASG	217.00
AS	143.00
ASSW	279.75
ABBS	189.15
ASBO	195.65
ASD	175.50
ASOL	179.35
ASTR	279.75
ASPH	279.75
ASE	196.05
ASEI	184.40
ASLB	1632.60
ASBT	1817.00
ASWG	143.00
ASSG	397.70
ASSR	480.50

OCION COLOURS	Per Kg.
iden Yellow HR	181.80
ill. Yellow H4G	117.85
pra Yellow H-8GP	168.55
rill. Yellow HE6G	166.95
ellow H-E4R	276.05
rill. Yellow H7G	332.30
ellow M4R	243.95
ellow M GR	326.05
Brill. Yellow M4G	177.10
Brill. Yellow M8G	332.30
Yellow M 3R	217.60
Brill. Orange H 2R	241.85
Brill. Red H 7B	157.95
Brill. Orange M 2R	313.15
Brill. Red H 8B	169.45
Brill. Scarlet H RN	245.05
Supra Red H-3BP	179.30
Brill. Red H-F3B	243.45
Brill. Magenta HB	167.00
Brill. Red M 5B	98.90
Brill. Red M 8B	173.70
Brill. Pink MB	137.10
Brill. Magenta MB	121.55
Brill. Purple H-3R	180.20
Brill. Purple H-7R	175.40
Navy Blue H 3R	298.50
Brill. Blue H-GR	366.55
Brill. Blue H 5G	173.10
Blue H 5R	283.85
Brill. Blue H 7G	178.70
Brill. Blue H 7RX	358.15
Turquoise HA	234.45
Supra Blue H-3RP	335.70
Supra Turquoise H 2GP	181.50
Blue H-ERD	305.80
Navy Blue H ER	258.80
Blue H 5RX	369.30
Navy Blue M 3R	310.95
Brill. Blue MR	331.70
Brill. Blue M RX	214.20
Brill. Blue M-G	382.30
Blue M 4GD	344.60
Navy Blue M RB	318.75
Turquoise M-G	197.85
Brill. Blue M GX	302.50
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide (per kg)	285.00
Green H 4BD	269.80
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	283.35

SULFUR COLOURS	Per Kg.
Navy Blue	99.85
Green G	198.55
Black Grains Extra	63.05
Black Grains OG	64.55
Black GXE Conc.	61.60
Black GXE	52.75
Black GXR	61.60
Black Grains 800	54.20
Black EXR Grains	64.55
Black EXR Grains 800	51.25

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Powder Fine	673.15
Yellow 5G Supra Disperse	439.30
Yellow 5G Acra Con.	628.75
Yellow 3R Powder	588.85
Gold Orange 3G Pdr. Fine	952.15
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp.	601.30
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	997.80
Brill. Red 3B Supra Disp.	713.20
Brill. Purple 4R Conc. Pdr.	470.75
Brill. Purple 3R Acra Powder	690.85
Brill. Purple 2R Hly Conc.	597.90
Brill. Purple 4R Supra Disp.	500.05
Brill. Purple 2R Acra Conc.	625.95
Blue R Powder Fine	542.15
Blue BC Conc. Pdr. Fine	522.50
Blue BC Acra Conc. Pdr. Fine	762.78
Blue R Conc. Pdr. Fine	577.65
Blue RR Supra Powder	629.35
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	389.25
Blue BC Supra Disp.	359.40
Jade Green XBN Powder Fine	438.20
Jade Green XBN Acra Conc. Powder	823.90
Jade Green 2G Pdr. Fine	419.65
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	496.00
Olive Green B Pdr. Fine	399.90
Olive D Pdr. Fine	444.30
Olive Green B Supra Disp.	308.20
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Pdr. Fine	698.55
Olive OMW Supra Disp.	539.05
Olive R. Pdr. Fine	422.95
Olive D Supra Disp.	361.70
Olive R Supra Disp.	363.90
Olive D. Ptg. Paste	193.00
Olive Green B. Ptg. Paste	199.10
Olive Green B Acra Conc.	542.75
Olive R Acra Conc.	640.00
Olive Green B Acra Conc.	542.75
Brown R Pdr. Fine	835.00
Brown G. Pdr. Fine	795.00
Brown R Pdr. Fine	659.75
Dark Brown 3R Pdr Fine	685.00
Brown G. Supra Disp.	449.90
Brown 2G Supra Disp.	554.00
Brown R Supra Disp.	422.95
Brown BR Powder	719.00
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	414.55
Brown G Acra Conc.	733.95
Brown R Acra Conc.	765.60
Grey M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	330.15
Direct Black AC Pdr. Fine	474.70
Direct Black CH Supra Disp.	393.20
Direct ACD Ptg. Paste	217.15

Madras Market

There has been brisk activity in the market with good enquiries. The widespread good monsoon has brought good hopes of market revival. With the relaxation in power cut in the Southern States, the production at various factories have picked up well and the consumption of material is likely to go up bringing good business. Similarly, with the better availability of items like Caustic Soda flakes, the prices have started ruling down. Oxalic acid has been in good demand with new units for Sulphamethoxazole coming up. Petroleum Solvents like benzene, xylene and toluene were in good demand and the prices marking up substantially.

(MADRAS MARKET RATES AS ON AUGUST 6, 1988)

Acetic Acid — Glacial (per kg)	18.50
Acid Slurry (Soft) (per kg)	28.00
Aluminium Sulphate Iron free (per tonne)	1,800.00
Ammonium Bi-carbonate (per 25 kg.)	130.00
Ammonium Chloride SPIC (per tonne)	2,400.00
Bleaching Powder — Mettur (per 25 kg bags)	120.00
Borax Granular (per 50 kg)	650.00
Cresylic Acid 98/99% (per kg.)	85+E.D.
Meta Cresol 40/42% (per kg)	39.00+E.D.
Para Cresol 96% (per ton)	60+E.D.
Caustic Soda Flakes (Mettur) (per ton)	8,500.00
Caustic Soda Flakes (Andhra Sugar)	8,600.00
Citric Acid — Indian (per kg)	48.00
Copper Sulphate (per 50 kg)	1000.00
Formic Acid (India) (per kg)	27.00
Formaldehyde (per kg)	9.00
Glycerine (per kg)	45.00
Hydrosulphite of Soda TCPL (per kg)	40.00
Hydrosulphite of Soda IDI (per kg)	44.00
Hydrosulphite of Soda BASF (per kg)	48.00
Hydrogen Peroxide (India) (per kg)	31.00
Hyflo Supercell	19.50
Magnesium Carbonate Light	18.00
Potassium Bichromate (per kg)	28.00
Phosphoric Acid (per kg)	20.00
Phthalic Anhydride (per kg)	22.00
Paraffin Wax (per kg)	13.50
Oxalic Acid (per kg)	25.00
Soda Ash (TAC) (per 75 kg)	320.00
Soda Ash (TATA) (per 75 kg)	325.00
Sodium Cyanide Indian (per kg)	56.00
Sodium Cyanide Degussa (per kg)	85.00
Sodium Bichromate (per kg)	20.00
Sodium Bicarbonate (per 50 kg)	290.00
Sodium Nitrite (per 50 kg)	750.00
Sodium Nitrate (per 50 kg)	450.00
Sodium Silicate (per tonne)	4500.00
Sodium Sulphate (per tonne)	3500.00
Sodium Sulphide Flakes (per tonne)	13,500.00
Sodium Bi-sulphite (Aswin) (per MT)	3,800.00
Stearic Acid (per kg)	30.00
Trisodium phosphate (per 50 kg)	400.00
Titanium Di-oxide Indian TTP (per kg)	48.00
Titanium Di-oxide Indian Rutile (per kg)	58.00
Urea Tech (per tonne)	2,800.00
Zinc Oxide (per kg.)	34.00
Zinc Chloride Powder (per kg.)	13.00
Zinc Sulphate (per tonne)	4,500.00
Di-octyl phthalate (per kg)	40.00
Di-butyl phthalate (per kg)	40.00
Hexamine (per kg)	32.00

SOLVENTS

Acetone (IOC) (per kg)	18.75
Isopropyl Alcohol NOCIL (per kg)	22.00
Diacetone Alcohol NOCIL (per kg)	29.00
Benzene SAIL (per kg)	17.00
Diethylene Glycol NOCIL (per kg)	46.00
Butanol NOCIL (per kg)	34.00
Toluene SAIL (per litre)	16.00
Xylene IPCL (per litre)	16.00
Phenol HOC (per kg)	28.00
Turpentine (per litre)	16.50
Sorbitol (per kg)	35.00
Trichloroethylene MCIC (per kg)	23.50
Carbon Tetra Chloride (per kg)	16.00
Chloroform (per kg)	26.00
Methylene chloride (per kg.)	24.00
Methyl Ethyl Ketone (per kg)	48.00
Cellosolve (per kg)	52.00
Triethanolamine (per kg)	23.50
Ethyl Acetate (per kg)	23.00
Butyl Acetate (per kg)	40.00
Methanol (per litre)	10.00

Delhi Market

DELHI: AUGUST : 5 (NNS) — Mercury suffered a steep fall of Rs. 250 at Rs. 11,000 per flask in the Delhi chemicals market during last week, owing to poor enquiries from industrial sectors along with renewed offering by stockists due to paucity of money, says NNS. Ammonia bicarb also dropped by Rs. 10 at Rs. 130 (per 25 kg.) on improved supply.

Titanium dioxide Anatase declined by Rs. 2 at Rs. 57 per kg. on profit taking selling by stockists. Titanium dioxide RC-822 moved up by Rs. one at Rs. 75 on stockists demand but later owing to increased supply, it turned easy and were traded at Rs. 74. Citric acid Bombay Dyeing bold suffered a fall of Rs. 50 at Rs. 2350 on withdrawal of demand. Stable bleaching powder KCI & MODI softened by Rs. 2 at Rs. 86 and Rs. 88 per 25 kg. on increased arrivals comparison with demand. Maruti and Shriram bleaching powder ruled static at Rs. 85 and Rs. 95.

Paraffin wax lost Rs. 5 at Rs. 625 on decrease in demand by candle manufacturers. Sodium hydro sulphite Tamilnadu drifted lower by Rs. one at Rs. 41 per kg. on poor sale. Chatkolight and sufolight also softened by paise 50/Rs. one at Rs. 50 and Rs. 55 in the absence of demand. Rangolite Germany, however, traded higher at Rs. 70 on dwindling stock position. Formic acid eased by Rs. one at Rs. 26 on comfortable stock position.

Menthol bold went up sharply by Rs. 8 at Rs. 235 on heavy purchasing made by exporters and stockists along with fall in supply from Sampalpur, Moradabad, and Rampur mandis of U.P. Menthol flake and medium also gained smartly by Rs. 5/8 at Rs. 205 and Rs. 225. Mentha oil rose by Rs. 4 at Rs. 164 and DMO ruled static at Rs. 97 per kg.

Phosphoric acid advanced by Rs. 20 at Rs. 890 (per 50 kg.) on sustained demand by textile units induced by poor supply in the market.

Other chemicals prices as well as dyes and colour remained unchanged at their previous levels.

(DELHI MARKET RATES AS ON AUGUST 5, 1988)

Ammonia Bicarb (per 25 kg)	130.00
Mercury (per flask)	11,000.00
Soda ash (per bag)	270-300.00
Ammonium chloride (per 50 kg)	125-180.00
Caustic soda solid	No Stock
Caustic soda flakes (per 50 kg)	400-405.00
Citric acid (per 50 kg)	2000-2,350.00
Stable Bleaching Powder Shriram (per 25 kg)	95.00
Stable Bleaching Powder KCI (per 25 kg)	86.00
Stable Bleaching Powder MODI (per 25 kg.)	88.00
Sod. Bicarbonate (per 50 kg)	265-275.00
Sod. Hydro Sulphite (per kg)	38-43.00
Rangolite (per kg)	50 70.00
Boric acid Technical (per 50 kg)	1015.00
Paraffin wax (per 50 kg)	625.00
Tartaric acid (per 50 kg)	6,025.00
Borax Granular (per 50 kg)	550.00
Borax Crystal (per 50 kg)	575.00
Sodium Nitrate (per 50 kg)	430.00
Sodium Nitrite (per 50 kg)	675-700.00
Camphor Powder (per kg)	87.00
Camphor Thal (per kg)	100.00
Menthol Medium (per kg)	225.00
Menthol Flakes (per kg)	205.00
Menthol Bold (per kg)	235.00
Glycerine (per kg)	47-48.00
Sodium Silicate (per quintal)	200-250.00
Hexamine (per kg)	42.00
Acetic Acid Glacial (per kg)	13-13.50
Copper Sulphate (per quintal)	2100-2300.00
Formic acid (per kg)	26.00
Formaldehyde (per kg)	8.00
Hydrogen Peroxide (per kg)	27-29.00
Calcium Carbonate (per tonne)	2500-4000.00
Acid Slurry Soft (per kg)	24.00
Acid Slurry Hard (per kg)	32.00
Phosphoric Acid (per 50 kg)	890.00
Pot. Nitrate (per quintal)	900-1200.00
Pot. Permanganate (per 50 kg)	2300.00
Sod. Bichromate (per 50 kg)	1050-1150.00
Tri-Sod. Phosphate (per 50 kg)	350-380.00
Titanium Dioxide **Anatase** (per kg)	57.00
Titanium RC-822 (per kg)	74.00
Zinc Oxide (per mt)	35,000-42,000.00
Phenol Carbolic Acid (per kg)	33.00
Carbon Tetrachloride (per kg)	20.00
Chloroform (per kg)	28.00
Sodium Sulphate (per 50 kg)	160-170.00
Naphthalene Balls (per 50 kg)	1350.00

DYES & COLOURS	(per kg)
Naphthol AS	150.00
Naphthol ASG	235.00
Naphthol ASBS	200.00
Naphthol ASTR	302.00
Naphthol ASOL	191.00
Naphthol ASBO	208.00

DIRECT DYES	(per kg)
Black E. Conc.	92-155.00
Diazo Black B.T.	125.00
Green B.	119.00
Blue 2-B	86.00
Sky Blue FB	200.15
Basic Auramine	55-100.00
Basic Rhodamine	220-320.00
Basic Methylene Blue	92-130.00
Basic Violet	142-160.00
Basic Malachite Green	160-185.00
Acid Orange	45-52.00

MATERIALS IMPORTED

BOMBAY

(From 16.2.88 to 19.2.88)

ACETIC ACID: From UK: Vivid Chemicals, 20,638 Mts., Rs. 1,78,185.

N-ACETYL-DL-METHIONINE : From FRG: Cyanamid India Ltd., 600 kgs., Rs. 66,225.

ADIPIC ACID: From USA: ALA Chemicals Ltd., 20,003.76 kgs., Rs. 3,24,642.

AEROSIL 200: From Belgium: Labella Pharmaceuticals, 1,860 kgs., Rs. 1,71,256.

ALDRIN TECHNICAL: From Netherlands: Prakash Pulverising Mills, 5,1500 kgs., Rs. 5,01,902.

ALKALI BLUE: From USA: Rainbow Ink & Varnish Mfg. Co., 300 kgs., Rs. 31,705; United Inks & Varnish Co. P. Ltd., 300 kgs., Rs. 32,562.

ALLYL NITRILINE: From FRG: Rathi Dyechem P. Ltd., 223.2 kgs., Rs. 62,689.

ALPHA PHENYL GLYCINE CHLORIDE HYDROCHLORIDE : From Netherlands: Ranbaxy Laboratories Ltd., 5,775 kgs., Rs. 16,72,015.

ALUMINIUM OXIDE SYNTHETIC BROWN: From China: Grindwell Norton Ltd., 57,000 kgs., Rs. 3,59,993.

ALUMINIUM STEARATE: From FRG: U.K. Paint Industries, 7,500 kgs., Rs. 1,68,052.

DL-2 AMINOBUTANOL: From FRG: Cadila Laboratories Pvt. Ltd., 7,000 kgs., Rs. 8,17,113.

ANILINE: From Romania: Uphar Projects Ltd., 22 Mts., Rs. 2,64,237.

ANISALDEHYDE: From Japan: Grauer and Weil (India) Ltd., 1,125 kgs., Rs. 1,38,613.

AROMATIC CHEMICALS: From FRG: Gupta & Co. Pvt. Ltd., 1,080 kgs., Rs. 1,48,717; From Netherlands: Fragrance & Aroma, 2,730 kgs., Rs. 42,533; From UK: Gupta & Co. Pvt. Ltd., 200 kgs., Rs. 10,435; Hindustan Lever Ltd., 3,000 kgs., Rs. 1,23,992.

L BASE (AMINODIOL): From China: Nirlac Chemicals, 1,000 kgs., Rs. 5,97,230.

BENZENE DISULPHONIC ACID: From FRG: Gurjar Gravures Pvt. Ltd., 1,000 kgs., Rs. 45,009.

BETA NAPHTHOL: From China: Priya Chemicals, 8.5 Mts.. Rs. 2,68,025.

BIS-O-CYANSTYSYL BENZOL: From FRG: Mihir Chemicals Inds. Ltd., 5,684 kgs., Rs. 29,32,769.

BISPHENOL: From Japan : Anand Organics Pvt. Ltd., 5,000 kgs., Rs. 1,16,735.

BROMO CHLORO DIFLUOROMETHANE: From UK: Kooverji Devshi & Co. P. Ltd., 2,340 kgs., Rs. 1,04,814.

BUTACHLOR TECHNICAL 924: From USA: Artee Minerals, 15,840 kgs., Rs. 6,16,590.

BUTANE: From UAE: Bharat Petroleum Corpn. Ltd., 3,977.613 Mts., Rs. 1,57,18,654.

N-BUTENE 1: From FRG: Indian Petrochemicals Corpn. Ltd., 37,400 Mts., Rs. 7,62,975.

2 BUTENE 1,4 DIOL: From FRG: Bharat Pulverising Mills P. Ltd., 15,600 kgs., Rs. 8,35,006; From USA: Excel Inds. Ltd., 32,749.92 kgs., Rs. 18,24,109.

BUTYLENE GLYCOL: From Japan: ALA Chemicals Ltd., 16,000 kgs., Rs. 3,97,111.

BUTYNEDIOL MONOPROXYLATE: From FRG: Grauer & Weil (India) Ltd., 480 kgs., Rs. 48,888.

CALCIUM NAPHTHENATE: From France: Sigma Paints Ltd., 1,560 kgs., Rs. 27,649.

CAPROLACTAM: From Belgium: Garware Nylons Ltd., 1,77,500 kgs., Rs. 43,55,555; Jagatjit Cotton Textile Mills Ltd., 2,48,500 kgs., Rs. 60,97,777.

CARBAZOLE: From FRG: PDI Chemicals Pvt. Ltd., 1,500 kgs., Rs. 82,498.

CARBOFURAN TECH.: From Japan: Pesticides India Ltd., 7,200 kgs., Rs. 9,81,533.

CARBON BLACK: From Australia: Goodyear India Ltd., 14,000 kgs., Rs. 9,54,269; Modi Rubber Ltd., 1,70,000 kgs., Rs. 13,29,118; From FRG: Esdee Paints Pvt. Ltd., 360 kgs., Rs. 65,852; From USA: Columbia Electronics Ltd., 825 lbs., Rs. 15,847.

CELLULOSE ACETATE BUTYRATE: From USA: Asian Paints India Ltd., 2,858 kgs., Rs. 1,62,933; Sikha Plast Inds. Pvt. Ltd., 2,000 kgs., Rs. 19,475.

CHLORHEXIDINE GLUCONATE: From Finland: IPCA Health Products Pvt. Ltd., 400 kgs., Rs. 33,756.

CHLORO 2,6 DIETHYL N (BUTOXYMETHYL) : From USA : Monsanto Chemicals of India Ltd., 15,840 lbs., Rs. 6,16,590.

6 CHLORO 4 METHYL THIOINDOXYL: From China: 550 kgs., Rs. 2,92,772.

4 CHLOROPHTHALIC ACID: From Japan: Sudarshan Chemical Inds., 250 kgs., Rs. 21,034.

CHLORO PROPIONIC ACID: From UK: Indmag Pvt. Ltd., 3.000 kgs., Rs. 65,218.

N - CHLOROSUCCINIMIDE : From Australia: Ranbaxy Laboratories Ltd., 1,000 kgs., Rs. 1,74,711.

CITRIC ACID MONOHYDRATE GRANULAR: From China: American Oxy Fruit Stores, 17.5 Mts., Rs. 2,99,913.

CRESYLIC ACID: From Japan: Dr. Beck & Co. (I) Ltd., 50,000 kgs., Rs. 7,62,766.

2 CYANO 4 NITROANILINE: From FRG: Jaysynth Dye Chem Pvt. Ltd., 1,062 kgs., Rs, 2,98,534.

DESMODUR T80: From Belgium: Polyfoam, 5,500 kgs., Rs. 1,53,527; From FRG: Jai Industries, 18,000 kgs., Rs. 5,02,452; From FRG: Satyen Chemical Industries, 2,500 kgs., Rs. 69,785; Tirupati Foams Pvt. Ltd., 7,500 kgs., Rs. 2,09,355.

DESMODUR R: From FRG: Swastik Rubber Products Ltd., 705 kgs., Rs. 1,04,547.

DESMODUR RF: From FRG: Swastik Rubber Products Ltd., 300 kgs., Rs. 51,332.

DESMOPHEN: From Belgium: Chemi Nova Inds. Pvt. Ltd., 30.960 Mts., Rs. 3,73,824; Polyfoam, 11,500 kgs., Rs. 2,59,600.

DICALCIUM PHOSPHATE DIHYDRATE: From UK: Dentifrices, 4,500 kgs., Rs. 69,566.

2,3 DICHLORO 1,4 NAPHTHAQUINONE: From Japan: Reine Chemicals, 500 kgs., Rs. 75,194.

3, 4 DICHLORO NITROBENZENE: From FRG: Gharda Chemicals P. Ltd., 1,000 kgs., Rs. 46,444.

DICUMYL PEROXIDE PERCUMYL: From Japan: Lakhani Rubber Udyog Pvt. Ltd., 1,500 kgs., Rs. 88,611.

DICYANDIAMINE: From FRG: Grindlays Pharmaceutical P. Ltd., 32,000 kgs., Rs. 7,69,171; Himachem Laboratories, 11,000 kgs., Rs. 2,64,402.

N N DIETHYL ANILINE: From UK: Super Dyestuff Inds., 950 kgs., Rs. 45,895.

DIETHYL CARBAMOYL CHLORIDE: From FRG: Burroughs Wellcome (I) Ltd., 4,560 kgs., Rs. 3,25,105.

DIETHYL SULPHATE: From Japan: Bharat Chemicals, 7,820 kgs., Rs. 1,40,632; Indian Dyestuff & Chem. Mfg. Co., 7,820 kgs., Rs. 1,39,809.

DIETHYL THIOPHOSPHORYL CHLORIDE: From USA: Gujarat Insecticides Ltd., 16.193 Mts., Rs. 5,02,582.

DI ISOBUTYL KETONE: From Italy: Haryana Leather Chemicals Ltd., 480 kgs., Rs. 15,567.

DI ISOPROPANOLAMINE: From France: National Organic Chemical Industries Ltd., 8,000 kgs., Rs. 2,64,355.

DIMETHYLAMINO 2 CHLOROPROPANE DIOL: From UK: May & Baker (India) Ltd., 3,465 kgs., Rs. 4,55,157.

DIMETHYL BENZYL CARBINOL: From Japan: S. H. Kelkar & Co. Ltd., 360 kgs., Rs. 44,636.

DIMETHYL BENZYL CARBINYL ACETATE: From Japan: S. H. Kelkar & Co. Ltd., 1,600 kgs., Rs. 1,98,384.

DIMETHYL FORMAMIDE: From Japan: Indian Dyestuff Ind. Ltd., 7.6 Mts., Rs. 85,352.

DIMETHYLHEXANOIC ACID From France: Aryavart Chemicals P. Ltd., 14.8 Mts., Rs. 2,46,915.

DIMETHYL PHENYLETHYL CARBINOL: From Japan: S. H. Kelkar & Co. Ltd., 100 kgs., Rs. 29,861.

DINITROTOLUAMIDE: From France: Tetragan Chemie Pvt. Ltd., 2,000 kgs., Rs. 1,92,363.

DIOCTYL TIN OXIDE: From Japan: Gandhi Parekh Invest. Corpn. Ltd., 1,000 kgs., Rs. 1,09,839.

DIPHENYLMETHANE DI ISOCYANATE: From Japan: Expanded Incorportion, 16,000 kgs., Rs. 3,63,531.

DIPHENYL OXIDE: From USA: Naarden India Ltd., 4,995.58 kgs., Rs. 1,22,245.

DIPROPYLENE GLYCOL: From FRG: Rishabh & Co., 400 kgs., Rs. 10,430; From USA: Jayant Oil Mills, 7,950 kgs., Rs. 89,855.

EDIFENPHOS TECH. 85' UP: From Japan: Bayer (India) Ltd., 15,120 kgs., Rs. 18,85,888.

EPICHLOROHYDRIN: From FRG: Cibatul Ltd., 69,920 kgs., Rs. 14,79,695.

ETHOXY METHYLENE MALONIC ACID ESTER: From FRG: Ranbaxy Laboratories Ltd., 5,000 kgs., Rs. 7,33,553.

ETHYLENE DIBROMIDE: From FRG: Searle India Ltd., 1,200 kgs., Rs. 20,254.

FERRIC OXIDE: From Belgium: Central Electronics Ltd., 54.18 Mts., Rs. 3,19,760; From FRG: Cosmo Ferriteix Ltd., 20,000 kgs., Rs. 5,80,953.

FORMAMIDE: From FRG: S. D. Fine Chem Pvt. Ltd., 3,450 kgs., Rs. 77,304.

FORMIC ACID 85%: From UK: Pefco Inds. Ltd., 2,145 kgs., Rs. 21,965; From UK: Seghal Knitwears, 20.748 Mts., Rs. 1,94,412.

FURFURYL ALCOHOL: From Belgium: Indian Core Oils Pvt. Ltd., 1,200 kgs., Rs. 26,486.

GAMMA FERRIC OXIDE: From FRG: Namrishika Electronics Ltd., 2,000 kgs., Rs. 1,28,738.

GLACIAL METHACRYLIC ACID: From USA: Indofil Chemicals Ltd., 14,697 kgs., Rs. 2,43,092.

GLYOXAL: From FRG: Metroni Drugs Pvt. Ltd., 17,500 kgs., Rs. 1,86,310; Unique Pharma Labs., 10,640 kgs., Rs. 1,09,408.

GUM ARABIC: From Sudan: J. Vithaldas, 100 Mts., Rs. 15,90,447; Nemchand Sons, 100 kgs. Rs. 16,22,906.

GUM ROSIN: From China: Associated Traders, 49,950 kgs., Rs. 3,24,257; Rollatainers Ltd., 34,200 kgs., Rs. 2,47,689; Usha Paints & Chemical Co., 17.2 Mts., Rs. 1,12,117; From Japan: Khanna Traders & Engineers, 1,550 kgs., Rs. 1,56,628.

GUM ROSIN N GRADE: From Finland: Shree Acids & Chemicals Ltd., 54 Mts., Rs. 3,76,086.

GUM ROSIN WW GRADE: From China: D S V Chemicals P. Ltd., 33,300 kgs., Rs. 2,26,035; Jain Enterprises, 17.1 Mts., Rs. 1,11,895; From UK: Shiva Paper Mills Ltd., 18 Mts., Rs. 1,26,198.

HEXACHLORO CYCLOPENTADIENE: From USA: Excel Inds. Ltd., 49.85 Mts., Rs. 11,55,278.

HEXYLENE GLYCOL: From Japan: Henkel Chemicals (I) Ltd., 2,090 kgs., Rs. 45,059.

HYDRAZINE HYDRATE: From France: Pacific Export, 16,000 kgs., Rs. 3,94,692; From Japan: Hindustan Pharmaceuticals, 11,000 kgs., Rs. 2,81,347.

HYDROFLUORIC ACID: From FRG: Rolex Chemicals, 1.980 Mts., Rs. 93,852; From UK: Reliance Inds. Ltd., 28,800 kgs., Rs. 9,58,918.

HYDROGEN PEROXIDE 50%: From Korea: Mahavir Textiles, 32.320 Mts., Rs. 2,72,752.

HYDROXYLAMINE SULPHATE: From FRG: Roche Products Ltd., 18,000 kgs., Rs. 4,83,991; From Japan: Technical Associates Drugs Ltd., 5,000 kgs., Rs. 1,45,603.

3-HYDROXY - 2 - METHYL QUINOLINE 4 CARBOXYLIC ACID: From FRG: Colour-Chem Ltd., 1,440 kgs., Rs. 4,89,626.

HYDROXY PHENYL GLYCINE METHYL POTASSIUM DANE SALT: From Singapore: Penisynth Chemicals, 1,000 kgs., Rs. 2,41,408

8 HYDROXY QUINOLINE: From Japan: Chemistar, 1,500 kgs., Rs. 2,84,367.

IODINE CRUDE: From Belgium: G. Amphray Laboratories, 20,000 kgs., Rs. 46,09,053; From Japan: Lub Cut Incorporation, 2,500 kgs., Rs. 6,88,844. The Atul Products Ltd., 1,000 kgs., Rs. 2,33,699.

ISOPHTHALIC ACID: From Japan: Refnol Oil Refineries Pvt. Ltd., 3,000 kgs., Rs. 44,014.

ISOPROPYL ALCOHOL: From FRG: Ranbaxy Laboratories Ltd., 25,520 kgs., Rs. 2,12,053.

LACTOSE: From Netherlands: Fulford (India) Ltd., 5,000 kgs., Rs. 61,499.

LINALYL ACETATE: From FRG: Rishabh & Co., 50 kgs., Rs. 7,415; From Japan: S. H. Kelkar & Co. Ltd., 510 kgs., Rs 78,843.

LINALOOL: From FRG: Rishabh & Co., 510 kgs., Rs. 64,410.

LITHIUM CARBONATE TECHNICAL GRADE: From USA: E. N. Gandhi Chemicals Pvt. Ltd., 997.9 kgs., Rs. 46,129; Himachem Laboratories, 2,200 lbs., Rs. 46,129; Kapex Chemicals P. Ltd., 4,400 lbs., Rs. 94,077.

L-LYSINE MONO HCL. FEED GRADE: From Japan: Aneesh International Pvt. Ltd., 2,500 kgs., Rs. 92,506.

MELAMINE RESIN: From Taiwan: Apsara Metallica Inds., 400 kgs., Rs. 3,376.

META TOLUENE DIAMINE: From Japan: National Dyechem Inds., 1,000 kgs., Rs. 37,124.

METHACRYLIC ACID: From Japan: PDI Chemicals Pvt. Ltd., 950 kgs., Rs. 27,974.

METHANE SULPHONIC ACID ANHYDROUS: From FRG: Reliance Silicones Pvt. Ltd., 27.21 kgs., Rs. 6,485.

DL-METHIONINE 98% FEED GRADE: From France: Aneesh International Pvt. Ltd., 2,500 kgs., Rs. 95,426.

DL-METHIONINE: From France: Bombay Pharma Products, 2,500 kgs., Rs. 97,375.

L-METHIONINE USP: From FRG: FDC Pvt. Ltd., 300 kgs., Rs. 1,02,864.

3-METHYL BUTANOL: From FRG: Naarden India, Ltd., 1,120 kgs., Rs. 47,910.

METHYL ETHYL KETONE: From France: Asian Paints India Ltd., 13,600 kgs., Rs. 1,71,327; Garware Plastics & Polyester Ltd., 27,200 kgs., Rs. 3,24,893; From Netherlands: Gujarat State Fertilizer Co., 0.892 Mts., Rs. 11,324.

METHYL HYDROGEN POLY SILOXANE: From France: Hico Products Ltd., 1,000 kgs., Rs. 48,860.

MICROCRYSTALLINE WAX: From Netherlands: Selective Dyechem P. Ltd., 5.980 Mts., Rs. 69,876; From USA: Richardson Hindustan Ltd., 14,144 kgs., Rs. 2,57,089.

MONOSODIUM GLUTAMATE: From Thailand: Bombay Pharma Products, 14,400 kgs., Rs. 2,43,046.

NAPHTHALENE CRUDE: From Australia: Amar Dye-Chem Ltd., 1,04,180 kgs., Rs. 5,95,142; From Canada: Kamadhenu Agrochem Inds., 45 Mts., Rs. 2,80,439.

NIKETHAMIDE: From Switzerland: Hindustan Ciba Geigy Ltd., 400 kgs., Rs. 1,04,675.

NOVALDIAMINE: From FRG: Bayer (India) Ltd., 1,980 kgs., Rs. 6,33,222.

OCTOIC ACID: From FRG: Union Laboratory, 5,130 kgs., Rs. 94.048.

OCTOIC ACID: From Sweden: A. S. Corporation, 5,130 kgs., Rs. 75,263; Modern Chemicals & Plastics, 4,940 kgs., Rs. 73,116

N-OCTYL MERCAPTAN: From Netherlands: Gujarat State Fertilizers Co. Ltd., 850 kgs., Rs. 9,741.

OCTYL PHENOL: From FRG: PDI Chemicals Pvt. Ltd., 2,000 kgs., Rs. 52,536.

OLEYL ALCOHOL: From FRG: Kores (India) Ltd., 8,500 kgs., Rs. 2,91,344; Pepega (Insulation & Packings) Ltd., 5,100 kgs., Rs. 1,74,806.

ORTHO CHLORO PARA NITRO ANILINE: From Japan: Diamond Dyes & Chemicals, 1,000 kgs., Rs. 80,979.

PARA CHLORO TOLUENE PURE: From FRG: Chemicrux, 14 400 kgs., Rs. 4,22,392.

PARA CHLORO TOLUENE: From Italy: Searle India Ltd., 17,600 kgs., Rs. 4,54,593.

PARA FORMALDEHYDE: From Spain: Coates of India Ltd., 5,000 kgs., Rs. 28,238; Pesticides India, 18 Mts., Rs. 1,00,490; Sarvodaya Pharma Products, 18 Mts., Rs. 1,00,490; Thermax Pvt. Ltd., 16,000 kgs., Rs. 97,634.

D - PARAHYDROXY PHENYL GLYCINE METHYL POTASSIUM DANE SALT: From Singapore: Gujarat Lyka Organics Ltd., 2,000 kgs., Rs. 4,82,977.

PARA NITRO ANILINE: From FRG: Nanavali & Co. Pvt. Ltd., 5,000 kgs., Rs. 2,81,920.

PARA NITRO CHLORO BENZENE: From France: Hiremath Chemicals Ltd., 19,440 kgs., Rs. 2,77,634.

PARA OCTYL PHENOL: From Japan: Indian Plastics Ltd., 6 Mts., Rs. 1,01,269.

PARA TERTIARY BUTYL PHENOL: From Japan: Indian Plastics Ltd., 2 Mts., Rs. 33,756; Tata Exports Ltd., 5,000 kgs., Rs. 84,391.

PATCHOULI OIL: From Indonesia: Gupta & Co. (P) Ltd., 400 kgs., Rs. 41,546; Seth Brothers (Perfumes) Pvt. Ltd., 600 kgs., Rs. 1,73,306.

PEPSIN: From Denmark: IPCA Laboratories Pvt. Ltd., 200 kgs., Rs. 20,774; Rallis India Ltd., 350 kgs., Rs. 1,58,987; Tata Exports Ltd., 500 kgs., Rs. 51,964.

PERCHLORO ETHYLENE: From FRG: C. D. Corporation, 10,044 kgs., Rs. 69,113.

PERCHLOROETHYLENE: From FRG: Ketuo Chemicals Ltd., 20.088 Mts., Rs. 1,38,228.

PHENOL USP: From USA: Hindustan Magcoban Chemicals Ltd., 8.4 Mts., Rs. 1,19,965.

PHENOLIC RESIN: From UK· Superabrassive Toolings Ltd., 200 kgs., Rs. 2,416.

PHENTHOATE TECHNICAL: From Italy: Vayaz Indian Pesticides (P) Ltd., 17,000 kgs., Rs. 12,38,005.

PIVALOYL CHLORIDE: From France: Kopran Chemical Co. Ltd., 3,060 kgs., Rs. 2,00,134; Ranbaxy Laboratories Ltd., 2,160 kgs., Rs. 1,27,767; From USA: Kopran Chemical Co. Ltd., 7,040 lbs., Rs. 1,82,804.

POLYAMIDE IMIDE RESIN: From Italy: Atlas Ware Pvt. Ltd., 3,080 kgs., Rs. 1,96,460.

POLYCARBONATE MOULDING POWDER: From FRG: LML Ltd., 9,900 kgs., Rs. 4,49,870.

POLYETHYLENE GRANULES: From Italy: Vindhya Telelinks Ltd., 500 kgs., Rs. 29,450.

POLYSULPHIDE POLYMER LIQUID: From USA: Choksey Chemicals Pvt. Ltd., 2.994 Mts., Rs. 2,40,029.

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POTASSIUM SILICATE: From FRG: Mullard Tubes (P) Ltd., 19,392 kgs., Rs. 1,50,106.

PROPIONIC ACID: From FRG: Industrial Organic Corpn., 16,380 kgs., Rs. 1,93,523; Naarden India Ltd., 630 kgs., Rs. 10,266.

PROPYLENE GLYCOL: From USA: M. J. Exports Pvt. Ltd., 8,385 kgs., Rs. 90,358; Rallis India Ltd., 16,202.44 kgs., Rs. 1,78,802; Shakti Organic Chemicals Inds. Pvt. Ltd., 8,385 kgs., Rs. 90,358.

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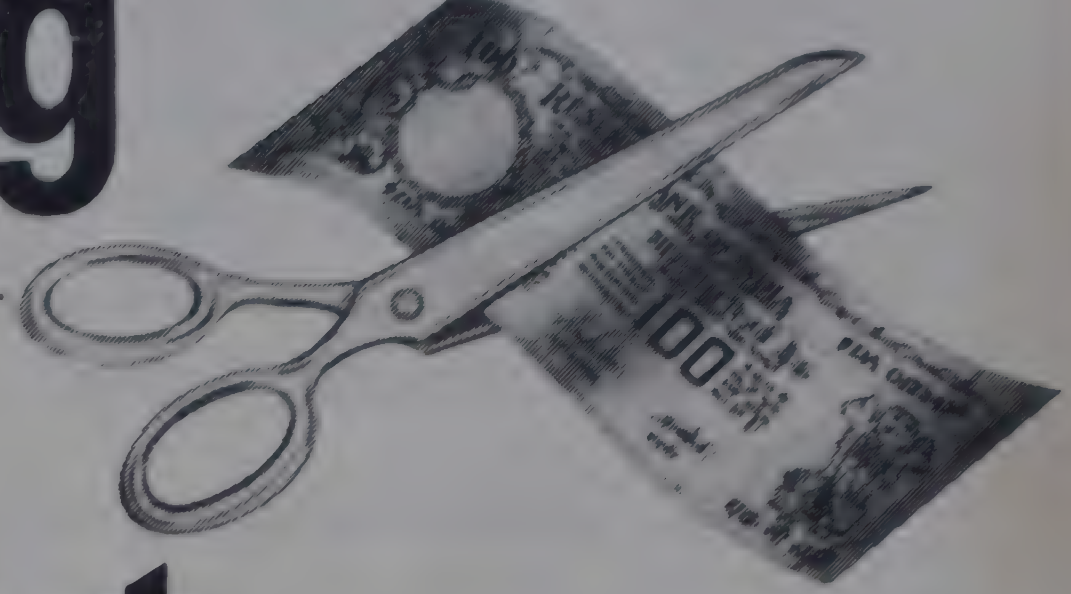

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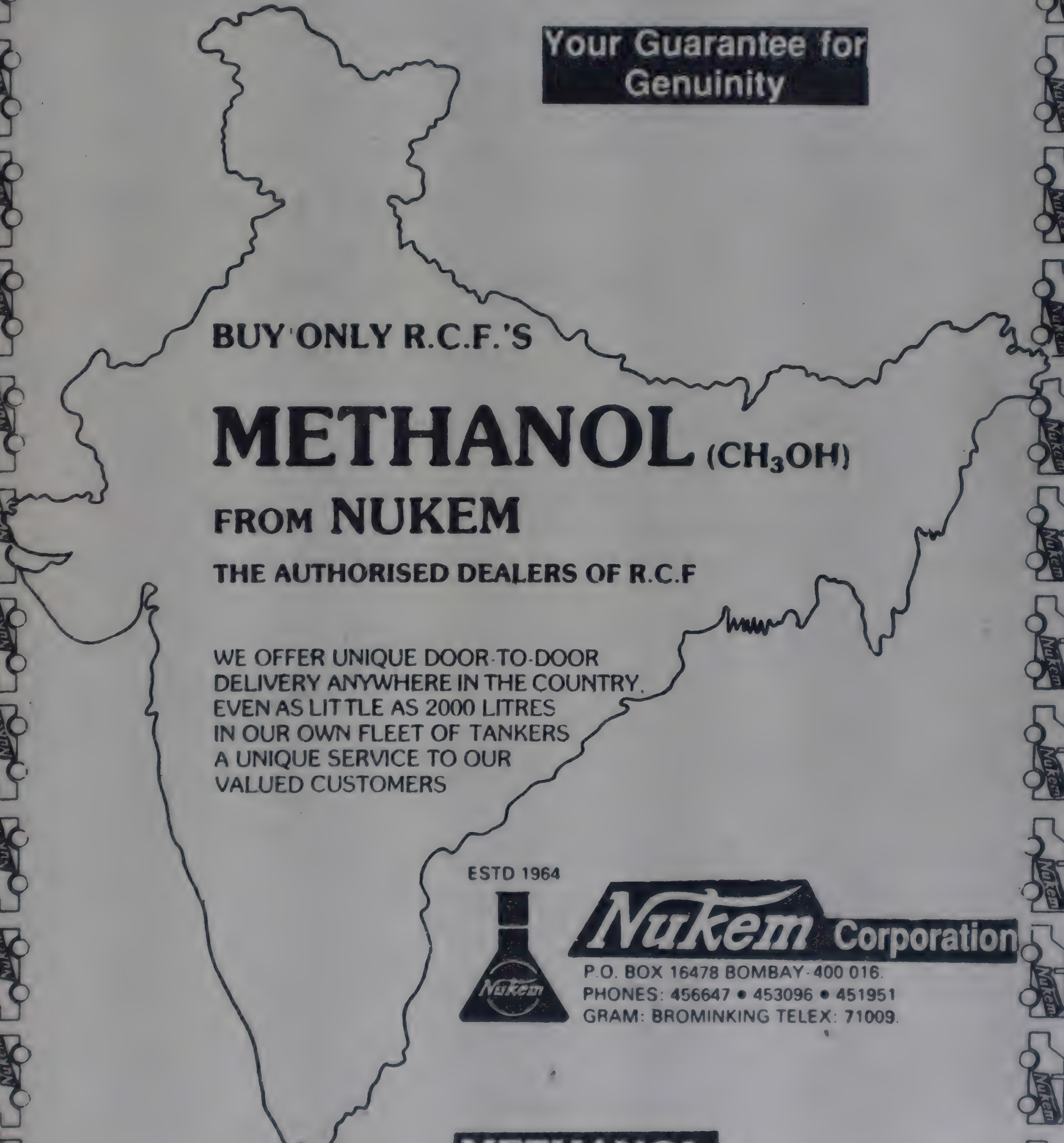

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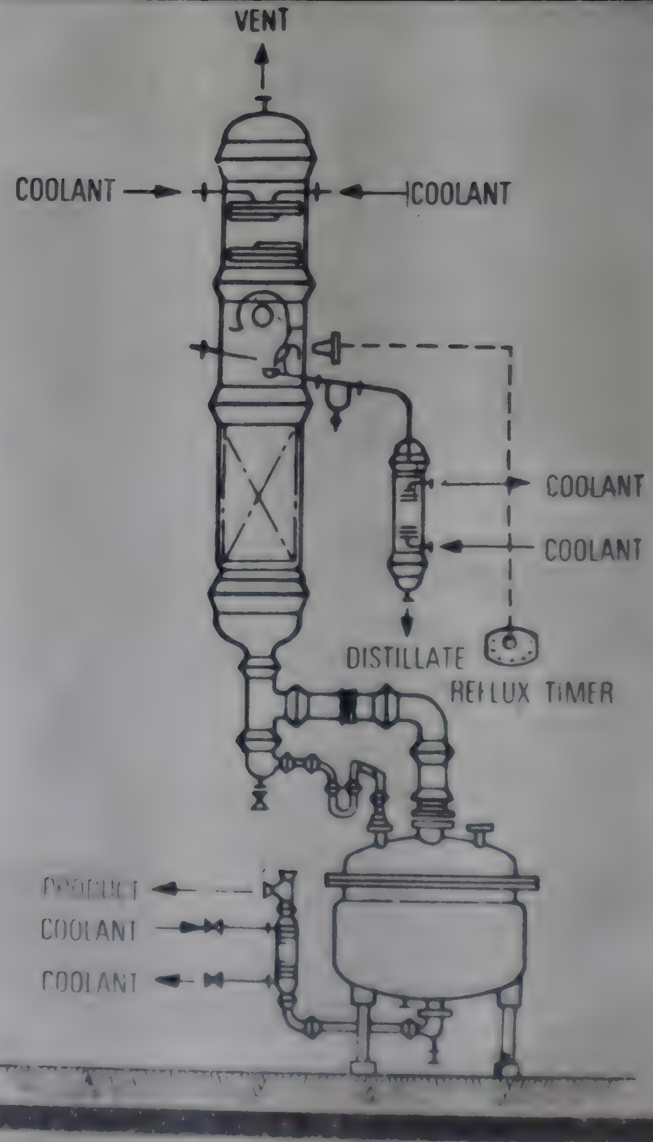
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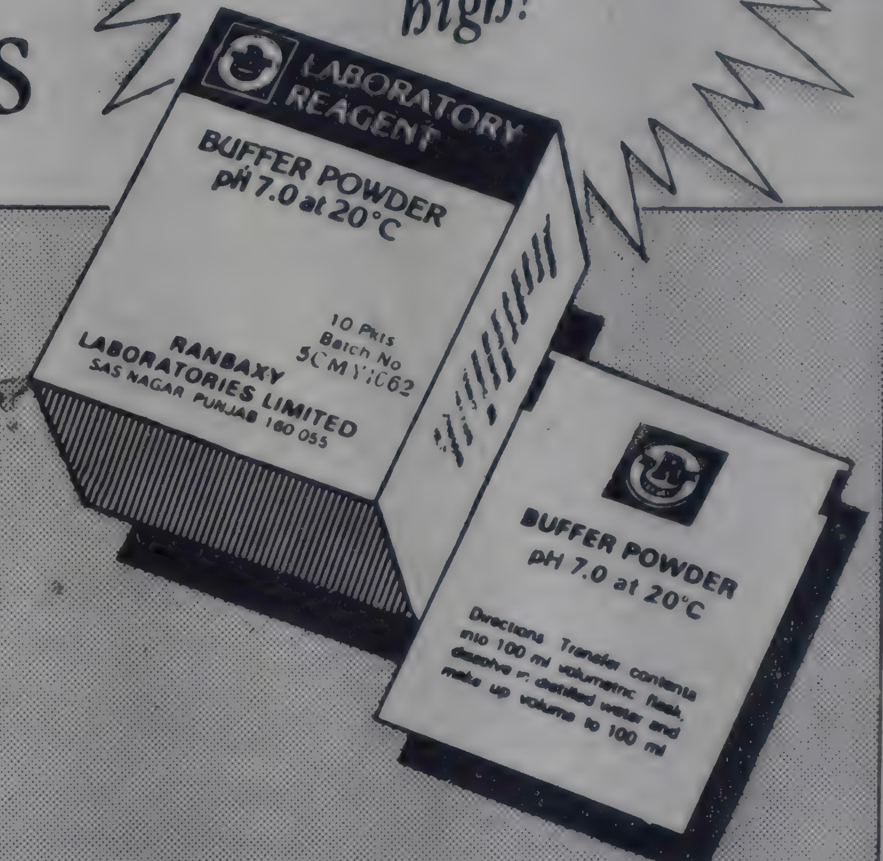
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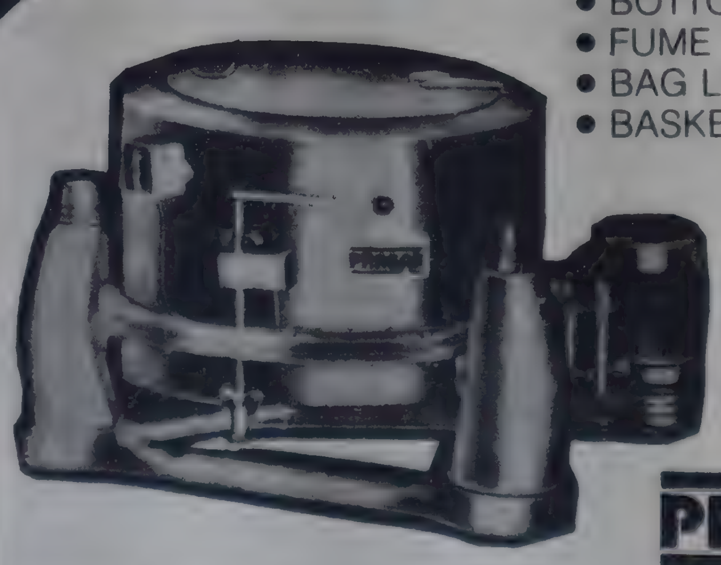

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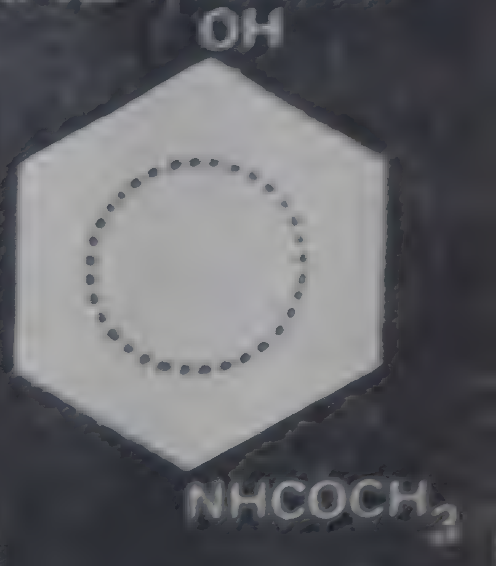

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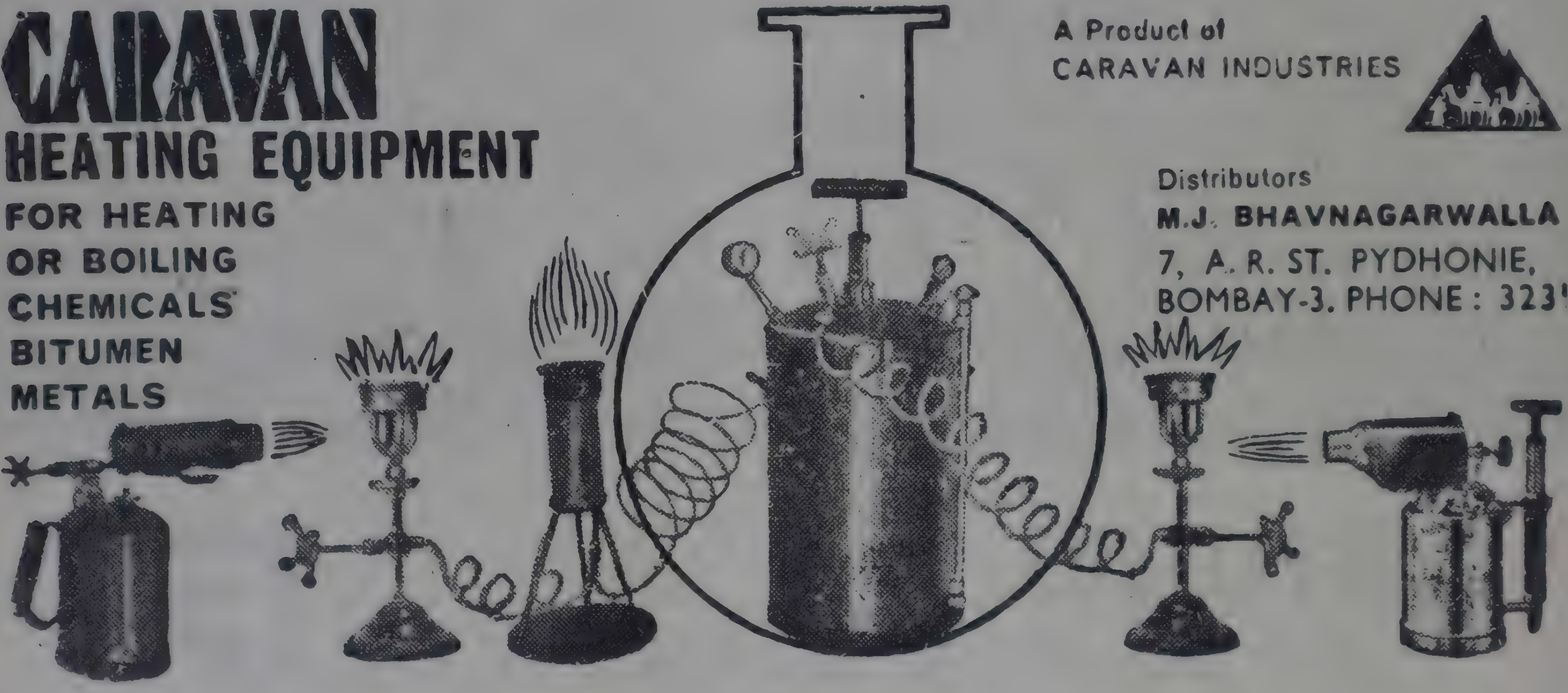

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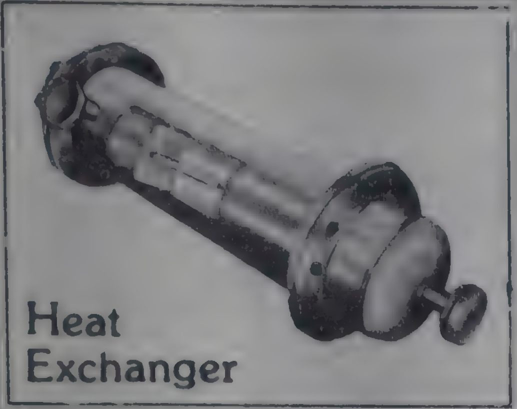
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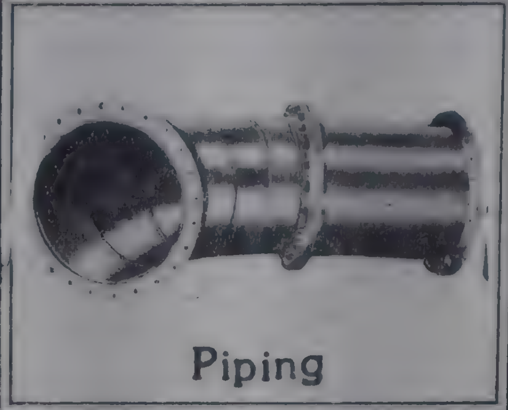

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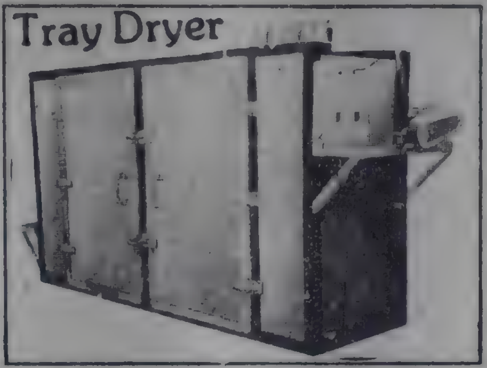

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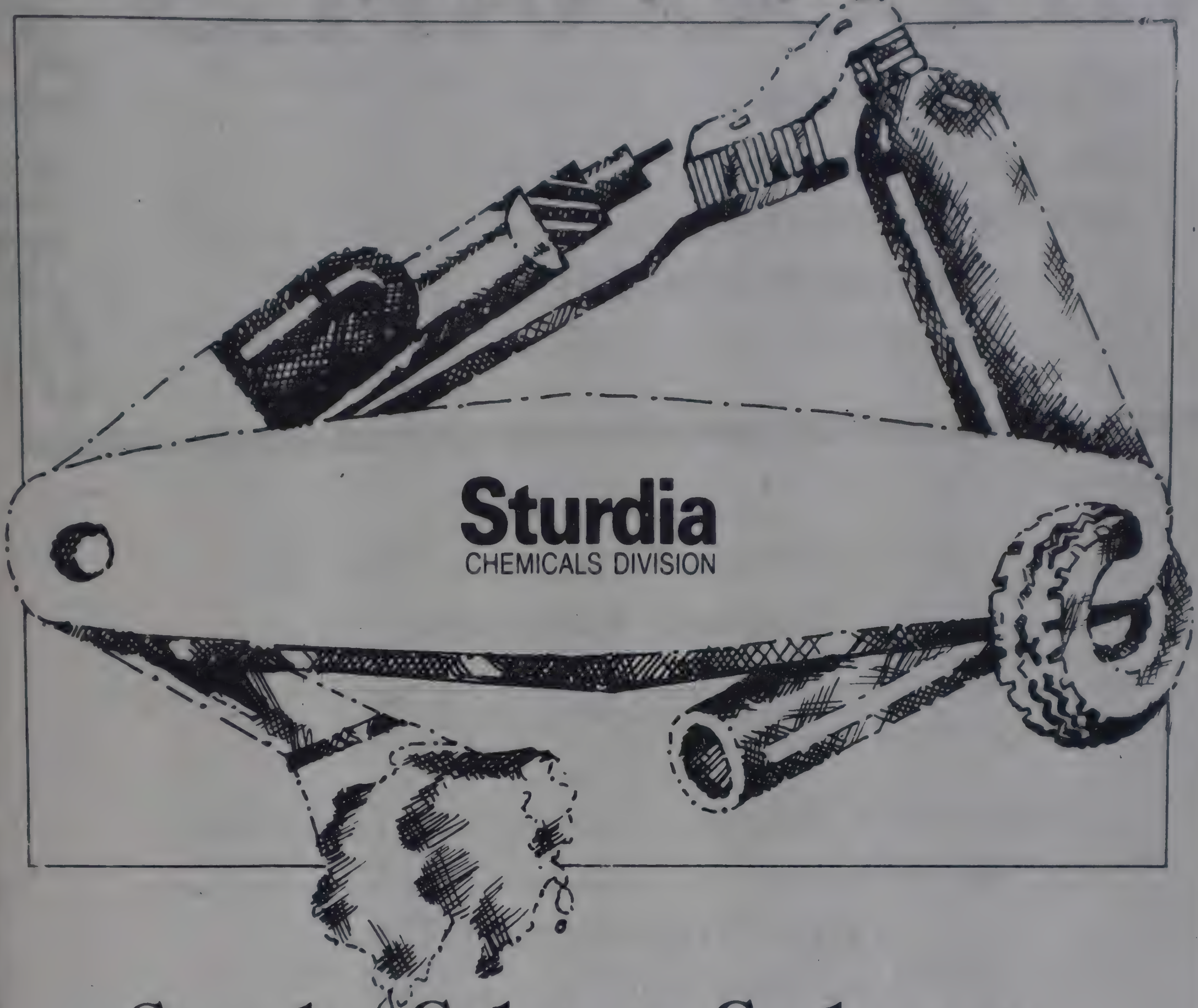

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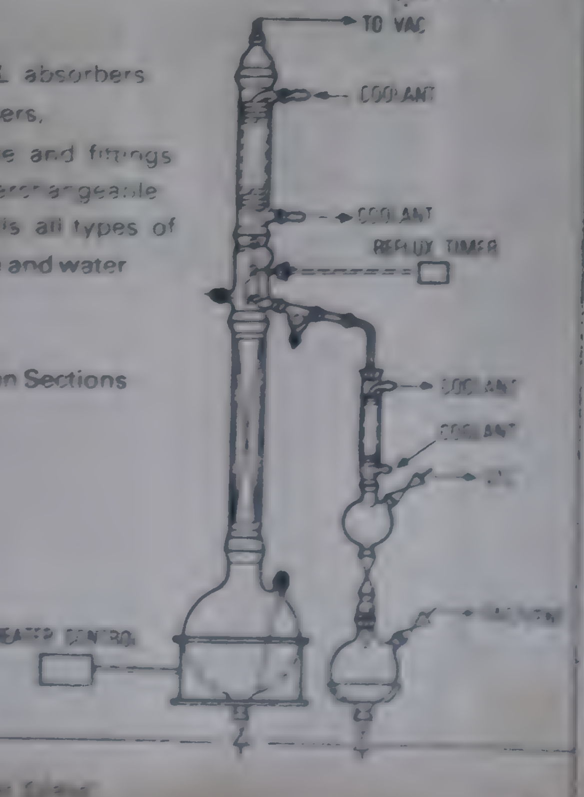

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CHEMICAL WEEKLY

VOL. XXXIII AUGUST 23, 1988 NO. 50.

Magnesium the Magic Metal from the Sea

The world production of Magnesium stood at 300,000 tonnes in 1981. As of today, it is about the same but may reach 400,000 tonnes soon, if not by the turn of the century.

India uses upto 1,000 tonnes of magnesium metal every year and the whole tonnage is imported. Consumed by both strategic as well as conventional industries magnesium has probably one of the widest application for metals.

The raw material for the process used is sea bitterns containing magnesium chloride. The metal is produced by the electrolysis of magnesium chloride mixed with other salts in molten state at temperature of 700°C, when magnesium metal is produced; metal is of 99.8% purity and is suitable for making coins. The energy consumption is only 15 KW/Kg.

Magnesium metal is extracted from sea water where it is found as much as 0.11 per cent i.e. about 1 kg in every tonne of sea water and since some 1333 cubic kilometers of sea water float over our earth, it has been estimated that industry could use 100 million tonnes of magnesium each year for a million years without using up its supply.

The first magnesium plant in India was set up at Jamshedpur by the CSIR mainly with a view to develop indigenous technology in India. Efforts to transfer this technology to Indian parties were not successful. A number of public sector organisations including Bharat Aluminium Company, Hindustan Aluminium Company and Bihar Industrial Development Corporation were reported to be interested but nothing emerged. The latest reports indicate that Andhra Pradesh Industrial Development Corporation are evincing interest.

An entirely indigenous production process has been developed by the scientists working at Central Electrochemical Research Institute (CECRI), Karaikudi, in Tamil Nadu and has been satisfactorily tested producing about 30 tonnes of Magnesium metal to the fullest satisfaction of the consumers. A prototype plant for the production of magnesium by fused salt electrolysis has been set up during 1985 at DMRL Hyderabad as a joint development project by CECRI. The plant was commissioned and operated steadily for four months at the production rate of 100-150 Kg/day with a current efficiency of 70%.

India's first magnesium plant based on indigenous CECRI technology has been planned to be set up at Valinokkam in the backward Ramanathapuram district of Tamil Nadu. This six crore plant utilising sea bitterns as the raw material has an annual targetted capacity of 600 tonnes.

Magnesium is not a consumer product and the average man may think it is far removed from his daily life but in actual fact we are surrounded by it in many forms. It is in our medicine chest as Epsom Salt or Milk of Magnesia. It forms light weight housing of many machines. It is used in making metal suitcases, binoculars and cameras. Its light weight makes it ideal for hard tools, sports gear and the like. The uranium plant of the Atomic Energy Commission consumes upto 100 tonnes of Magnesium per year.

It is also used in making automobile parts Lighter than the common metal aluminium, it goes into some automobile engine parts and racing cars have used magnesium alloy wheels for several years. The Swedish car manufacturing company Volvo recently developed a prototype engine containing nearly 50 kgs of magnesium in alloy form. It is also used by the die casting industry and in the production of strategic metals like berrylium, titanium, zirconium and uranium. Magnesium metal powder is an essential raw material for the pyrotechnic industry which flourishes at Sivakasi in the Ramanathapuram district of Tamil Nadu.

The annual requirement of magnesium powder is about 200 tonnes a year and is made by three manufacturers in India out of the imported metal. India is reported to be the only country in Asia to possess the technology to manufacture magnesium powder.

A material finding increasing popularity in pyrotechnics is the 50/50 alloy of magnesium and aluminium termed magnalium. The Chinese make wide use of magnalium in fireworks items to produce attractive white sparks and cracking effect.

Magnesium is a very reactive metal and makes an excellent fuel under conditions. Magnesium metal is found in most white light formula. In an oxidising flame the metal is converted to the high melting magnesium oxide, MgO, an excellent white light emitter. Also the high heat output of magnesium containing compositions helps in achieving high flame temperatures.

With the advancement of naval technology the demand for power sources of varied nature has grown leaps and bounds during the last three decades. The need for primary, activated and secondary batteries is enormous today. The submarines make use of a very high voltage and high ampere hour capacity batteries for their operation. A large number of equipment used for monitoring the signal for detection of submarines and other undersea units need activated batteries.

Magnesium-Silver Chloride, Magnesium-Cuprous chloride batteries are useful systems. In this type of application in recent years magnesium-lead chloride battery systems developed by CECRI are gaining in importance.

The torpedo is an undersea weapon which needs high power for a short duration of four to six minutes. The battery system has to be reliable to secure precision targetting an is of secondary importance. Presently m sium — silver chloride battery is being us application in sea to sea battle.

Magnesium is mostly used to produc minium alloys. A mere pinch of magn makes aluminium both stronger and eas draw to great length and thinness. Ligh ductile, it is one of the easiest of all met machine. A cutting tool shaves a thin ed a huge slab of magnesium as a housewife bread. Heated to nearly 200°C and p through a die, it assumes virtually any sha less than two minutes.

Until 1930, there was a lack of intere the part of large potential users like th craft and automobile industries. Germa attacks on London during World War II ch the tide. British aeronautical experts, at to account for German Luftwaffe spee bomb-loads, discovered by examining d German planes that magnesium-aluminiu loys were a major structural material i German aircraft.

Today almost 50 years later, magnesiu found thousands of uses in the industry. used in many ultra light weight chainsaws a lumberman can carry suspended from hi pocket, hold in one hand and use it to fell, cms. diameter tree in a few minutes. One nesium ramp is so light and strong that a 10 ne truck can drive up on it, yet so light t man can carry it away. It is widely us satellites because its lightness enables a vehicle to reach orbit with hundreds of grams more instrumentation. When Marine was unsuccessful because of failure of its glass shroud, spacecraft designers replaced with magnesium metal and Mariner IV past the planet Mars on schedule.

Magnesium alloys are increasing the and payloads of aircrafts on duty in any Because nearly 300 magnesium parts are p any tactical fighter they can carry nearly tonnes of arms including cannons, guided mis bombs and rockets. Thus the greater pa per kilogram on any supersonic aircraft in vice today The navy uses a torpedo that l

(Contd. on p

CHEMARENA

S. L. VENKITESWARAN

T. & L. move into U.S.A.

Tate and Lyle of U.K. one of the largest producers of sugar is bidding for Staley Continental of USA, one of the largest HFCS producers. This could give them a share of 15% of US sweeteners market (up from 6 percent). Staley have a large business in Food Service business which will be sold off if T & L acquire it. But Staley shareholders are not likely to oblige.

Animals get patent coverage

US Patent office has issued the first patent for a genetically altered animal to Harvard University, US Pat 4736866. This covers a mouse designed to be particularly susceptible to cancer and thus help in testing carcinogenicity of chemicals and help in the design of newer cancer therapies. The patent covers 33 oncogenes from different animals ranging from chicken to human beings. The cancer causing agents can be inserted into mouse germ cells immediately after fertilisation to make the progeny highly susceptible to the particular form of cancer including breast cancer and leukaemia. There are said to be 21 more applications with the US Patent Office. A number of transgenic animals have been produced including a mouse that secretes a blood clot dissolving drug in its milk, an overgrown mouse incorporating rat growth factor genes and a cross between a goat and a sheep called a geep.

It was a year ago that the Patent Office ruled that animals could be patented. Patent coverage for genetically altered microbes was first issued in 1980 to set the ball rolling for modern biotechnology. There is much criticism on the latest decision particularly by animal groups and a Bill to hold up such patents for 2 years is before Congress. Industrial Biology Association welcomes the Patent and expects this will open up the area by published information instead of under-warp trade secrets **(Source: Chemical Week** of 20.4.1988).

Biomass gasification

Battelle Labs. in USA have released their specially developed knowhow on thermal biomass gasification to an engineering company for exploitation. Biomass contains a lot of water and requires a lot of energy to get them to dry before they can be processed. But Battelle have overcome this by **in situ** reaction of a 90% water slurry in the presence of a proprietory transition metal catalyst. The slurry is pumped into the reactor and at 350-450°C and pressures of 2000-4000 psi. the biomass is gasified in solution. The pressure prevents evaporation and the gases are separated downstream to emerge as a medium Btu methane/carbon dioxide mix which can be used for process heat or generation of electricity. The surplus energy generated is claimed to be large. Bench scale continuous treatment of wide variety of wastes from breweries, potato peels, grape pomace etc. The catalyst is suspended in a spinning basket in the reactor. It is expected that the engineering company will first design and build a mobile 5 t/day wet pilot plant for detailed engineering of a 10,000 gallons/day plant.

Caustic Soda prices soar

There has been concern at the large increases in the price of petrochemicals and polymers but the price rise has extended to other chemicals — notably to caustic soda. In Europe the price is of the order of $ 500 per tonne for spot sales and $ 200 for the running contracts. Spot prices have doubled in the past few months. Contract prices are expected to move up further to $ 230/240. US prices have also moved up and so too in Japan where it has gone up to $ 422 to

528/mt. Japan has a huge export to Australia for aluminium production in joint ventures. Production in Japan was a record 3.2 million tonnes last year. World alumina production has risen to 28 million tonnes and is moving up 4% a year. European spot sales of 20000/30000 tonnes have gone to USA. European production is at full capacity level of 8.6 million tonnes. Suddenly caustic soda is more valuable than chlorine.

A consequence of the jump in prices in USA is that producers are being hauled up for price fixing in a class action suit by one of the purchasers. Of twelve producers six have s for payment of $ 11.9 million but six other not interested and the case may go for The six include Dow Chemicals. Long term tract price from the middle east have gon from a distress level of $ 45 to 50/te in Ja to three times that price. Producers can 275-290/te and maybe $ 300 in a short We were so worried about dumping price els from Saudi Arabia where chlorine for left a lot of caustic at ridiculous price leve of $ 45/te cif Indian port and raised the cr heavy customs levies. Such a situation is likely to arise again.

Enzymes in organic solvents

Enzymes being the active catalysts of bioreactions act in aqueous medium but apparently they can remain active in some aqueous-organic solvents as well. There have been reports of lipase activity in organic solvents. Now the action of horseradish peroxidase in water-miscible organic solvents is reported from scientists of the University of Iowa. Peroxidases catalyse biosynthesis of lignin in plants which in essence is the biosynthesis of high molecular weight phenolic resins. Use of the peroxidase to synthesise phenolic polymers in aqueous medium failed presumably due to the solubility problem and molecular weight attained was below 500. Now 85% dioxane with water helps the generation of polymers from phenol with molecular weight of 25000 and with no formaldehyde needed. The enzyme is not activ pure dioxane. Horseradish peroxidase is active in solvents like methanol and dio mixed with water. This enzyme is said t readily available at low cost for large uses.

Some powdered enzymes suspended in ganic solvents have shown activity and s also novel properties. Chymotrypsin which talyses hydrolysis of peptides in aqueous tion promotes transesterification of amino in a variety of anhydrous organic solvents far less substrate specificity. There are planations of such strange activity on the of substrate enzyme binding characteris Some of these enzymic reactions can alter face of synthesis of bio compounds in future

Geotextiles

Plastic fibremats from polypropylene have become very useful to reshape landscape and for construction. Close to 300 million square yards of what are called geotextiles were used last year and an annual growth of 10 to 12% is expected until 1992. Phillips Fiber Corporation, Timberlake, SC, is a leader in this. A Supac Geotextile under a layer of crushed rock strengthens roads built on soft soil. It is used to prevent soil erosion in riverbanks or ocean shoreline — it could be a boon for some of our eroding seashores such as in Kerala. Salt fences to retain sediment that would otherwise pollute the site are very useful. The largest use is to form asphalt overlays absorbing the liquid asphalt beneath the road surface and forming a waterproof seal. Polypropylene is the polymer of choice for geotextiles and is durable and of lower cost. Geotextiles may be in contin filaments wound together into yarn and w into desired shape or separate pieces joinec gether. Many application of non wovens being taken over by geotextiles or geom branes. Landfills and waste sites can be pro ly handled for lining. For waste sites the mat is unrolled and covered with soil, asp or other aggregate and serves as an excel barrier. A new material called Texsol France is said to be made by weaving cont ous polymer fibres into soil mixtures at the struction site. 35000 m^2 of Texsol is said to been used already since 1982. There is to have a detailed study of some of the av ble geotextiles and methods of applicatior prevent soil and coastal erosion in India.

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RPL will start making EO

Reliance Petrochemicals Ltd. (RPL) is expected to join the list of producers of ethylene oxide (EO) by 1989-90.

Out of its licensed capacity of 60,000 TPA, RPL would require about 40,000 tonnes of glycols for captive consumption of Reliance Industries Ltd. Part of the remaining 20,000 tonnes would be marked as EO depending on the market demand, industry sources say.

In 1990, RPL, along with India Glycols, is expected to contribute around 18,000 TPA of EO. Another 5,000 tonnes will be produced by IPCL's Maharashtra gas cracker complex around the same time. Ethylene is reacted with oxygen to produce ethylene oxide which is further processed to manufacture monoethylene glycol (MEG) and polyethylene glycols.

Meanwhile, EO consumers, whose products have shown a spurt in demand in the domestic and international markets, have urged manufacturers to step up production. However, against the background of growing demand, relative shortage would continue until fresh capacities are commissioned, industry sources say.

At present, there are only two manufacturers of EO — Indian Petrochemicals Corporation Ltd. (IPCL) and National Organic Chemical Industries Ltd. (NOCIL). IPCL produces around 600 tonnes a month and NOCIL around 900 tonnes.

EO consumers (producers of textile auxiliaries, emulsifiers, pesticides and pour point depressants) have charged that NOCIL and IPCL are diverting EO for the manufacture of glycols. They attribute this to compulsions following worldwide shortage of MEG. Though priced high MEG can be imported, while EO, being a hazardous gas, cannot be imported, according to Mr. M.D. Dhamankar of the Indian Chemical Auxiliaries Manufacturers Association (ICAMA).

A spokesman for EO manufacturers denies the charge that they are giving priority to production of MEG. IPCL [illegible] 7,420 tonnes in 1987-88, 42 per cent more than its production during the previous year. Indeed, IPCL sold more EO by cutting down glycol production, he says. Similarly NOCIL put 10,000 tonnes into the market this year as against less than 9,000 tonnes last year.

The spokesman has acknowledged that there has been a shortage of EO of late, caused by the shut-down of IPCL's and NOCIL's production facilities. The recommissioning got delayed because of catalyst change. Both plants have now resumed production. He has denied that there was any pressure to divert EO to manufacture MEG.

He says EO consumers have been highly erratic in lifting supplies of this hazardous gas which has to be consumed early, failing which it will create storage and environmental problems. Only a year ago there were few takers for EO and producers had to offer discounts, he adds.

At a news conference in Bombay recently, ICMA officials said textile exports, which is a major foreign exchange earner for the country, would be adversely affected if the chemical industry is not supplied with EO condensates. EO is also a vital raw material for the manufacture of ethanolamines, glycol ethers, dye intermediates and leather chemicals, all of which are either import substitutes or thrust areas for export.

EO consuming industries employ some 20,000 people, and a majority of the units are in the small sector. According to ICAMA, the industry requires about 20,000 tonnes of EO.

CRL EXPANSION AWAITS CLEARANCE

Cochin Refineries Ltd. (CRL) which which hopes to complete on schedule its aromatic project now under implementation is awaiting Central clearance for yet another expansion programme already submitted to the Government.

The Rs. 80-crore expansion scheme now before the Centre, envisages the increase of the refinery's processing capacity by 1.5 million tonnes a year. The present processing capacity of the Cochin Refineries is 4.5 million tonnes of crude oil per annum. The proposed expansion scheme would help the refinery raise it to six million tonnes.

Talking to a team of newsmen who visited the refinery at Ambalamugal recently, the CRL Chairman and Ma ing Director, Mr. J. Jayaraman, cla ed that the expansion scheme c be completed in 13 months. In c words, once the final clearance is en, the refinery's processing cap would go up by 1.5 million tonn

CORRIGENDUM

In the Advertisement of A-O Chemicals, Published in the Cher cal Weekly Issue of 19th July (Pa Number 59), the Pincode of A medabad was Wrongly Publishe The Correct Pincode Number 380 001. The Error Is Regrette — The Advertising Manager.

Mr. Jayaraman said that the ex sion scheme is being actively cons ed by the Union Government.

The Chairman stated that by 198 the Cochin Refineries is likely to eve cent per cent capacity utilisa The refinery had already achieved 9 per cent capacity utilisation last y The refinery processed 4.1 mi tonnes of crude against its capacit process 4.5 million tonnes, he po out.

On the Rs. 85-crore aromatic ject Mr. Jayaraman said the wo in progress and is expected to be missioned on schedule within the proved cost. The project has a cap to produce 87,200 tonnes of ben and 12,000 tonnes of toluene ir year.

Besides, the project would also duce 19,250 tonnes of liquid pet um gas, 6,000 tonnes of petrol and lakh tonnes of diesel oil a year.

Naphtha produced in the refine self is the major raw material fo project.

The benzene unit of the aro project is to be commissioned by ruary next. By August next, the ene production would also be com sioned.

Mr. Jayaraman informed tha refinery is now installing at a co Rs. 10 crores a microprocessor distributed digital control system system made in Japan is to safer operations in the refinery also to help optimise production.

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HFL may import PTFE resins

The government may not take the extreme step of totally banning the import of polytetrafluoroethylene (PTFE), a raw material for the engineering plastics.

Instead, Hindusian Fluorccarbons Ltd (HFL), the sole manufacturer of PTFE resins in the country, may be entrusted with the task of importing grades which it does not manufactura for the user industry.

This seems to be the government's line of thinking, according to the processors who had a meeting, with HFL authorities to discuss the issues connected with the manufacture of PTFE by HFL.

Mr. M.S. Murthy, adviser (Chemicals), department of chemicals and petrochemicals who attended the meeting, is reported to have told the processors to submit a list of grades of PTFE which are used at present in their units along with their annual requirements of each grade.

He is also reported to have told the processors that if HFL was not in a position to manufacture these grades, the company would arrange for their imports.

The processors fear that the new arrangement may lead to a situation whereby the inefficiencies of HFL would be passed on to the processors by pooling the prices of imported and indigenously manufactured PTFE resins.

Another area of fear, seems to be that in a monopolistic situation achieved by HFL, at the expense of small processors, the prices would be hiked according to the suppliers whims and fancies leading to attrition of the processors margins and ultimately hitting the very viability of these units.

The inability to supply resins at international prices would lead to stifling of export earnings for PTFE finished goods, according to a processor.

The processors, however, were able to get an assurance from HFL that it will go into the lacunae in the import policy regarding the import policy regarding import of certain finished goods of PTFE such as tapes, tubes, sealants, scrap tapes, which at the moment has hit the indigenous units very badly. HFL has promised to help the processors by representing on their behalf with the various ministries concerned.

Against a world demand of 40,000 tons of PTFE resins of various grades India's demand is only a meagre 200 tonnes. The processors say that this gives no room for foreign suppliers to dump PTFE in the Indian market.

The government's thinking to ban import of PTFE on this ground, is an excuse to cover up for the short-comings of HFL the processors said While 50 to 60 grades are availabla worldwide, HFL manufactures only 11 grades.

Moreover, processors have frequently complained to HFL about the poor quality of the molding grades, dispersion grades and glass filled grades. Though HFL had admitted to the poor quality of its resins to individual processors and also during the meeting, it is yet to take corrective measures to solve the problem.

With most of the supplies of HFL going abegging, because of the inferior quality, the HFL chairman and managing director Mr. H. Krishnamurthy, is reported to have told the processors during the meeting that if their consumption of HFL manufactured resins is not increased, HFL will seriously consider manufacturing downstream PTFE finished goods.

This is bound to affect the market ability of small scale processors and also violate the internationally accepted practice of a resins manufacturer not processing its own end products, the processors claimed.

PROTEST AGAINST INCREASE IN PRICES OF POLYMERS INDIGENOUSLY

Mr. Anil B. Goradia, President, AIPMA has issued the following statement to the press:

The periodic increase in the price of raw materials by indigenous manufacturers taking advantage of the shortage of commodity plastics in the international market has now become a common feature. Only about four months ago, IPCL raised the price of LDPE by Rs. 3/- per kg. Now, it is rep ted that it is contemplating to r the price again and this is bound be followed by other manufacture If this trend goes on, the small sc processing units, a majority of wh are in the small scale sector, will driven to the wall as it is not possi to pass on such rises to large en users. At the same time it will aff several vital applications of the co mon man. In this situation, the o solution lies in the Government dras cally reducing the customs duty on e sential raw materials so that the pr cessing units can import their need requirements. If this is not done i mediately, many of them will fall si and eventually die. At the same tim the Government has also a duty to d vise suitable machinery to stop arbitr ry increase in prices by indigenous m nufacturers especially when the inpu such as naphtha, continue to be ava lable to the petrochemical units at 8 87 prices only from public sector unit

CONCERN OVER DELAY IN REVISING CRUDE OIL ROYALTY

The Members of Parliament electe from Gujarat have expressed concer over the delay in revising the rate c royalty for crude oil. It is felt that th existing rate of royalty has no reasonable relationship with the market valu of crude oil. They said that the rat of royalty should be immediately revised to reflect the current market valu on the basis of the principle of net back value.

The members noted that if the royalty rate is revised on this principle with effect from the due date, April 1 1987 the State's financial crisis would be alleviated.

PROF. N. R KAMATH MEMORIAL LECTURE

Prof. N. R. Kamath Memorial Lecture by Dr. F. A. Mehta (Chairman, Goodlass Nerolac Paints Ltd. and Forbes Group) on Decaying Cities — Decaying Industries? is to be held at 6.00 p.m. on Thursday, 8th September 1988 at the University Department of Chemical Technology, Matunga, Bombay-400 019. All are cordially invited.

Plant for "Kevlar" to be built in Japan soon

E.I. Du Pont de Nemours and Toray Industries announced on 8th Aug. that they have decided to proceed with plans for a manufacturing facility for Kevlar (TM) Aramid Fibre in Japan. The continued high growth rate of sales of Kevlar in Japan and Asia, plus the very positive response of customers to several new, second-generation products, has encouraged them to take this step.

In January, 1985, the two companies formed a business relationship on Kevlar in their 50/50 joint venture, Du Pont-Toray, Co., Ltd. (TDC), to market and produce this High Performance Fibre in Japan. Working closely with Du Pont-Toray to sell fibre imported by them from the United States, Toray's "KEVLAR" Department has developed extensive market and product knowledge with Kevlar.

After detailed studies are completed later this year, design and construction of manufacturing facilities for Kevlar will begin. The plant to be built by Du-Toray Co. is currently being planned to be located within Toray's Tokai site in Aichi Prefecture.

Production capacity is projected to eventually reach 5000 tons per year. When this capacity is ultimately installed, it is estimated over 10 Billion Yen (USD 78 million) in permanent investment will be required. Du Pont will license its patented production and product technology for Kevlar and will bring more than 15 years manufacturing experience and know-how to the joint venture.

After construction is complete at the end of 1990, Du Pont-Toray will produce Kevlar Fibre to supply market needs in Japan and other countries in Asia. The plant will have the newest design and the most advanced technologies, including those that were recently demonstrated by Du Pont during the commercial startup of a new manufacturing plant for Kevlar near Londonderry, Northern Ireland, which serves European markets.

Du Pont-Toray's plant will be the third manufacturing facility, for Kevlar in the world. Du Pont has been producing Kevlar in Richmond, Virginia since 1971.

Kevlar is the first and foremost Super Para-Aramid Fibre. It was invented by Du Pont over 20 years ago and introduced in Japan and Asia in 1974. It has found numerous applications throughout the world in many high performance and highly engineered applications. Kevlar is used as reinforcement for Radial Tyres, Power Transmission Belts, Industrial and Automotive Houses, Advanced Composites for Aerospace and Sports equipment, Friction Products such as brakes and clutches, Speciality Cables, Ropes for safety, fishing and other marine uses, and in Cut, Heat and Ballistic Resistant Protective Apparel.

SUPPORT ASSURED FOR PETROCHEM UNITS IN ORISSA

The Centre has assured the Orissa Government that it would give all-out support for the development of the chemical and petrochemical industries in the State.

The assurance was given by the Union Chemical and Petrochemicals Secretary, Mr. H. K. Khan, during his meeting with the Chief Minister, Mr. J. B. Patnaik, in Bhubaneshwar recently.

He said the State's plastic industries, which had hitherto been getting only 10 to 15 per cent of their raw material requirement, would henceforth get their full requirement, both from indigenous and imported sources.

He said difficulties faced by Orissa Synthetics Ltd., a joint sector unit in Dhenkanal district, in raw materials procurement and other matters, would be taken care of in consultation with the Industrial Development Bank of India (IDBI), other Central agencies and the State Government.

Mr. Khan gave the assurance that his department would lend full support in case the proposed basic drugs complex is coming up in Orissa. He indicated that the Indian Petrochemicals Corporation Ltd. (IPCL) and Petrofils Ltd., both Union Government undertakings, were providing assistance in various fields in Kalahandi and Koraput districts.

Mr. Khan, who also had a meeting with the Industries Minister, Mr. Niranjan Patnaik, and top officials, also promised that the State's proposal for the setting up of a few petrochemical industries such as biaxially oriented polypropylene (BOPP) would be favourably considered.

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Antop Hill godown

The proposed chemical godown at Antop Hill at Bombay has been classified as "the most hazardous unit" and an expert committee appointed by the state government has opposed the project.

The state government has kept the report of the expert committee headed by Mr. R. K. Garg confidential. A writ petition seeking cancellation of the licence given to the Antop Hill Warehousing Corporation is pending before the Bombay high court.

Meanwhile, it is learnt that the government while accepting the Garg committee report, sought further advice on what could be stored in the proposed godown. Based on a list of non-hazardous chemicals given by the Garg committee, the state government permitted the Antop Hill Warehousing Corporation to build its godown. However, the Union government intervened and asked the Maharashtra government to stay the permission granted until further notice.

Though the Garg committee submitted its report in July, 1987 the state cabinet had approved it only a few months ago. This included the list of chemicals allowed to be stored.

No Responsibility

The Garg committee was appalled to find that there was no one to accept responsibility for the safety aspects of the grandiose chemical godown project. The promoters of the project said they would only build the godown and allot the premises to their members. The members were free to store whatever chemical they wanted in any manner and in any quantity. Absence of a responsible agency for ensuring safety was the primary ground on which the Garg committee opposed the project.

Assuming that someone could be found for ensuring safety, when the committee asked if there was any mechanism to prevent storage of different chemicals in the same enclosure, there was no assurance. [illegible]

The project report did not envisage installation of any safety systems or equipment. Should any chemical drum leak, there was no specified procedure to handle the situation.

On top of it, the proposed godown is surrounded by residential areas and the Garg committee asked the promoters how these inhabitants could be removed to safer zones. The answer was that they came much later than the project was envisaged and the government could be approached to shift them. But the Garg committee did not find any satisfactory solution to protect human beings living near the site.

Chemical List

Studying the list of hundreds of chemicals proposed to be stored, with no accompanying safety measures, the Garg committee disapproved the proposal. However the members of the Antop Hill Warehousing Corporation, comprising industrial and business personalities, sought the government's help in utilising the place. The corporation had already spent crores of rupees on the project. Then the Garg committee was asked to give a list of what could be stored in the place.

A state government source said the ball was in the court of the Centre and the state government has kept the matter in cold storage. If the Bombay high court directed the state government to produce the Garg committee report, it would be forwarded.

Mr. R. K. Garg, chairman and managing director of Indian Rare Earths Ltd., when contacted declined to give details of the report on the ground that it would be improper for him to do so. He, however, deplored the attitude of the state government in keeping the report confidential as it was a matter of public importance.

Courtesy: The Times of India

PRICE WAR BY SMALL UNITS HITS DRUG EXPORTS

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(Contd. from p. 34)

no telltale wake of bubbles, because it uses magnesium silver chloride wet cell battery instead of compressed air for power. Seawater triggers the electrochemical charges of this battery just as distilled water triggers a car battery. The same cells provide independent power for ocean buoys which collect meteorological data and radio it back to the base station on the coast.

Dow Chemicals of the US is the single largest producer of magnesium today, followed by West Germany. Today a surprising 90 per cent of magnesium produced in the US comes from sea water. Magnesium ranks eighth in the order of metal production.

International Magnesium Association reports of two technologies that help brighten magnesium's long term assured future. The first involves selectively reinforcing stress point castings. These castings could combine the magnesium aluminium weight advantage with the stiffness characteristics of steel. Candidate auto parts include pistons, connecting rods, rocker arms, cylinder heads and engine blocks. The second technology involved the application of magnesium extrusions to high volume non-weather exposed auto parts. Extruded magnesium is currently being evaluated for structural applications by highway truck trailer manufacturers.

Because of the prevailing high prices of the metal in the international market, the Govt. of India have issued a letter of intent for a second Magnesium plant to be located in Orissa.

India's current requirement of this metal are being imported from Canada, West Germany, UK, USA and Norway.

Average human being carries about one ounce of magnesium, half of it in bone salts, the rest in individual cells where it activates various enzymes involved in producing chemical energy. A very small amount is circulated for external fluids and helping in nervous and muscular [illegible]. Magnesium deficiency [illegible]

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[illegible] but also the outgo of foreign exchange will continue on a prolonged basis in the form of dependence on spares and replacements.

Already, most of the existing domestic units have [illegible] collaborations with access to the latest technology and a considerable amount of foreign exchange is remitted every year for this purpose, the sources point out.

Because of these existing collaborations, the indigenous manufacturers have been able to supply equipment in the past to major fertiliser plants and other companies. The major plants to which equipment have been supplied are: Hindustan Fertiliser Corporation Limited (HFCL), National Fertilisers Limited (NFL), CFL, IFFCO, GNFC, [illegible], Kribhco, Indo-Gulf Fertilisers, Sri Ram Fertilisers, Mangalore Chemicals and Fertilisers, RCF, Neyveli Lignite Corporation, Oil and Natural Gas Commission (ONGC), Engineers India Limited (EIL), SCIC, FACT, Rourkela Steel Plant SAIL, IEL, TISCO, UPSEB and MPEB.

GLOBE ORGANICS TO PRODUCE NEW DRUG

Globe Organics Ltd., belonging to the Dr. Reddy's group of companies, plans to produce dextromethophan, a drug which is now the monopoly of two US multinationals.

Globe's ranitidine plant at [illegible] ([illegible] district) went on stream in June 1988. It is expected to produce 30 tonnes of ranitidine this year. Ranitidine is the latest in a series of H2 antagonists, a billion dollar product with a growth rate of 25-30 per cent per annum. The company plans to step up production of this [illegible] anti-ulcer drug to 100 tonnes to meet the increasing demand.

Cheminor, also belonging to Dr. Reddy's group, pioneered the production of Ibuprofen in India and is today the largest producer. It made 212 tonnes of this drug last year. More than 80 per cent of this drug is exported.

With the commissioning of [illegible] and cephalexin plants, and the diversification of Cheminor, Dr. Reddy's group is poised to reach a turnover of Rs. 60 crores in 1989-90 and expects to earn more than Rs. 25 crores in foreign exchange from exports.

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FERTILISER PROJECTS :

Marked progress in execution

With a third HBJ gas-based fertiliser project expected to go on stream shortly, fertiliser project management seems to have registered major improvements.

The Indo-Gulf Fertilisers and Chemicals Project at Jagdishpur in UP will not only be ready on schedule, but also without any cost overrun. The Aonla unit of the Indian Fertiliser Cooperative Limited (IFFCO) was also ready in time early this year, as was the National Fertilisers Limited's Vijaipur plant late last year. Both these projects were also commissioned at less than the initial project cost.

This is a major change from the history of fertiliser project in India — with cost and time overruns being routine in the 1970s and early 1980s. The average project gestation period has been reduced from between 48 and 60 months to 36 months. It is being further reduced to 30 months in the second stream of Aonla.

Experts in the fertiliser industry attribute this change to several factors; better project management, closer monitoring of schedules, the use of proven technology and free access to foreign exchange.

A quick analysis of some of the major fertiliser project that were delayed in the past reveals that bilateral financing, tied aid and unproven technology were the main factors responsible for time and cost overruns. There was a mismatch of technologies and equipment. This was the time when the country was experiencing a foreign exchange crunch and equipment orders were placed with countries that offered aid.

The coal-based plants at Ramagundam and Talcher were planned when the coal-based fertiliser technology was in, its infancy. At that time only one coal-based fertiliser plant was in operation in the world, in South Africa and India could not seek its help. T result was a four-year delay in comm sioning the plants and costs regist ed an almost a 100 per cent increa

The Sindri rationalisation plant w based on Bulgarian technology, tied the use of Bulgarian aid. This w also behind schedule by almost f years and had a more than 100 cent cost overrun. The plant never erated at more than 20 per cent of capacity and had to be ultimately c sed.

Durgapur and FACT Cochin I also the victims of bilateral credit a upproven technologies. Haldia sho have been commissioned in Decem 1976 and is yet to start production. has a record 19 bilateral credits to credit.

As against this, the projects fin ced by the World Bank and those h ing free access to foreign exchar were completed in 36 months. Haz Vijaipur and Aonla were also ready commissioning within three years the zero date.

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The World Bank-financed projects or those having free access to foreign exchange were free to select proven technologies. IEL has the ICI technology. DCF Thal, Hazira, Vijaipur, Aonla and Jagdishpur have Haldor Topsoe and Snam/Kellogg technologies.

International competitive bidding also ensured the supply of the right equipment to these plants at competitive prices and in time.

With the passage of time, the Indian consultants have also gained experience and move from an era of ad hoc planning to the latest techniques of management. Experience has also made the consultants cut down on time required for detailed engineering. Earlier this task used to take at least 18 months. Now it takes six months less.

Moreover, since most of the recent fertiliser plants are gas-based, these require much less equipment than those run on Naphtha, fuel oil or coal.

An expediting team has become absolutely essential for all the fertiliser projects. Earlier, the promoters used to leave the entire job of expediting the project to the consultants. Now, besides the promoters taking a direct interest in the early completion of the project, also insist on the consultants forming the expediting teams for the timely procurement of equipment and completion of the project.

Industry sources say that a competent expediting team can save six to eight months of completion time. Indo-Gulf Fertilisers had a six member expediting team.

Immediately after finalising the project plans, orders are placed for the supply of equipment. It has been increasingly realised that every year of delay results in a 10 per cent cost overrun.

In earlier projects, design and procurement used to be the responsibility of the consultant and the promoter used to get the civil work done at the site himself. This used to result in the equipment reaching the site and the civil work not completed or vice-versa.

This trend changed in 1978-79 when the single-point responsibility came into existence. Sources say that this was another major factor that helped in cutting down drastically on time and cost overruns.

INDIAN STANDARDS RELATING TO PETROLEUM, COAL AND RELATED PRODUCTS

The Bureau of Indian Standards has published the following new and revised Indian Standards relating to the field of Petroleum, Coal and Related Products:

IS:446-1987 — Rubber air hose **(fourth revision)**

IS:517-1986 — Methanol (methyl alcohol) **(second revision)**

IS:1012-1987 — Turbine lubricating oils **(second revision)**

IS:1088-1987 — Lubricants for clock like mechanism and precision instruments **(second revision)**

IS:3400 (Part 1)-1987 — Methods of test for vulcanized rubbers: Part 1 Tensile stress-strain properties **(second revision)**; (Part 4) — Accelerated ageing **(second revision)**

IS:9316 (Part 2)-1987 — Methods of test for rubber latex: Part 2 Determination of viscosity (RL:2) **(first revision)**; (Part 7) — Determination of total copper (RL:7)

Copies of these Indian Standards are available from the Sales Services at BIS Headquarters at New Delhi and Regional and Branch Offices located at Bombay, Calcutta, Chandigarh, Madras, Ahmedabad, Bangalore, Bhopal, Bhubaneshwar, Guwahati, Hyderabad, Jaipur, Kanpur, Patna and Trivandrum.

NOCIL HIKES MEG PRICE

The National Organic Chemicals Industries Limited (NOCIL) has hiked ex-factory selling price of MEG (mono ethylene glycol) by Rs. 1,500 per tonne today, it is learnt.

NOCIL's new selling price is Rs. 18,850 per tonne against Rs. 17,350 prevailing since the beginning of the current year.

The Indian Petrochemicals Corporation Limited (IPCL), the only other MEG producer in the country, had raised its selling price from Rs. 17,400 per tonne to Rs. 18,500 from August 4, 1988.

MEG is one of the major raw materials for polyester industry. Its availability from indigenous sources have come down considerably and even supply from international markets is erratic.

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SHAHJAHANPUR FERTILISER PROJECT :

NRI, Oswal Agro main contenders

A non-resident Indian and the Oswal Agro group are emerging as the main contenders for the Shahjahanpur gas-based fertiliser project.

Most of the public and co-operative sector fertiliser companies are also in the run for the project, the letter of intent for which was held till recently by the Caparo group of Mr. Swraj Paul.

The non-resident Indian this time is one Dr. B.K. Pande who is a leading heart specialist in the USA. He is executive vice-president of the US-based Shakti International Resources Incorporated.

Dr. Pande reportedly met Prime Minister Rajiv Gandhi in New York during his visit there, and showed interest in taking up the project. The Prime Minister reportedly advised Dr. Pande to write to the concerned ministry regarding it.

In his application for the letter of intent, Dr Pande has offered to meet the entire foreign exchange requirement of the project. He has also offered to arrange all the funds required for his share of the equity.

In its application for the letter of intent, the Oswal Agro group has said that it wants to diversify into production of urea fertilisers.

The existing range of the group's activities include manufacture of industrial hard oil, vegetable ghee, refined oil, sugar, toilet soap, distilled battery acids, glycerine, oxygen, rice, chemicals and power generation (from agro waste).

It has joined hands with the Punjab State Industrial Development Corporation for implementing the Rs. 62-crore 100 per cent export-oriented unit — Oswal Agro Furane Limited — for the manufacture of furfural and edible rice bran oil. The project consists of rice milling with 120 tph capacity — the largest in the world.

The group says it has sub
financial strength. Its annual t
for 1987 was Rs. 200 crores,
projected to exceed Rs. 300 c
1988 and Rs. 500 crores in 1

Based on the current market
the net worth of the group com
stands at Rs. 300 crores.

According to the application
group companies have surplus
to the extent of Rs. 100 crores
can be gainfully utilised in the
The group will be willing to in
further annual accruals for the
pose.

It says that the group enjoys
lent rapport with and confidence
shareholders numbering 2.5
and is confident of raising fur
sources from its shareholders.

The group says that it is in
in setting up a 2,500 tpd urea
ser plant. The funds required
met from surpluses available
internal accruals and shareh
It has asserted that "all funds
shall be met from our own re
without involvement of any loan
any financial institutions."

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TITANIUM NITRIDE COATING SAVES JET MONEY

Significant savings in overha
and in the scrap rate of expensiv
ponents are being made at the
million pound Joint European
(JET) fusion project as a res
using titanium nitride coating te
gy developed by the Tecvac c
from Cambridge in eastern Engl

In the past, up to 30 per c
expensive alloy fasteners were
ped because they "picked up",
welded, and jammed. They ha
drilled out laboriously and expen
Now, following the introduction
nium nitride coating to these fa
the scrap rate has been reduced
one per cent.

Tecvac says that the same
technique could also benefit
clear systems and high level e
ing systems such as gas turbin
power generating equipment.

The JET laboratory near Lo
one of the leading co-operative
pean research centres. It was
in 1978 to design, build and
the latest nuclear fusion exper
machine, the precursor of fusio

ors for generating electricity without eliance on fossil fuels.

In the heart of the system is one of ne world's largest ultra-high vacuum systems, capable of operating at high temperatures and ultra high vacuum continuously for periods of up to 12 months between maintenance periods. Temperatures as high as 100 million degrees centigrade are being sought and the overall aim is to create nuclear fusion as a source of energy in the same way that it is generated in the sun and the stars.

The alloy fasteners now treated by titanium nitride are used to hold graphite tiles in places within the fusion chamber, where the fusion process is held within a magnetic "cage". Because of the arduous conditions, all fasteners have to be made in heat resistant alloys or other performance materials which are notorious for their ability to "pick up" or cold weld. Previously, other coatings such as gold and silver plating were tried, but they were expensive and only provided a partial answer.

The application of titanium nitride coating by Tecvac's PVD process has solved the problem. The coating has low co-efficient of friction, chemical inertness and an insignificant effect on the very close screw tolerances required of the fasteners. Tecvac has just completed a batch of 20,000 fasteners for the JET laboratory, having processed a similar quantity last year.

Now, the laboratory managers can confidently predict the time for maintenance periods, knowing that virtually all the fasteners will easily undo, thus allowing the maintenance period to proceed unhindered.

Further applications for the coating are envisaged by Tecvac in large and highly stressed machines that have to use high strength fasteners under difficult conditions — such as aircraft and al gas turbines, and electricity generating turbines. Further information from Tecvac Ltd, Stow cum Quy, Cambridge, England CB5 9AB.

PORT POLICY CHANGES HIT ORMIC ACID UNITS

Manufacturers of formic acid have eged that large quantities of duty-free material imported under the advance licensing scheme are being released in the open market at cheap prices, causing serious marketing problems.

The three manufacturs of formic acid — Periyar Chemicals Ltd., Kerala Acids and Chemicals Ltd, and Southern Formates Ltd. have a combined installed capacity of 3,700 tonnes.

All the three have reported large inventories. A fourth unit with a capacity of 5000 tpa is scheduled to begin production later this year. Formic acid is used in leather chemicals.

Manufacturers have complained that recent modifications in import policies have adversely affected them. These include raising of the Rep entitlement of formic acid for finished leather exports from 1.5 per cent to five per cent by the December 1986 notification. The earlier entitlement of 1.5 per cent was fixed after a detailed study by BICP and did not warrant change they feel.

This liberalisation has resulted in the import of several hundreds of tonnes of formic acid by the trade. What has alarmed the indigenous units is that as per the 1988-89 policy, the Rep entitlement has been further increased to "an alarming 15 per cent". With leather exports projected at Rs. 1,000 crores per annum, import of formic acid will exceed 12,000 tonnes against the country's total requirement of about 4,000 tonnes, according to the manufacturers.

They have requested the Government to effect the following changes: restoration of Rep entitlement to 1.5 per cent, withdrawal of the facility to import formic acid under the advance licensing scheme and increasing the basic import duty from 100 per cent to 150 per cent.

NALCO RECORD

The public sector National Aluminium Company (NALCO) has set a record by exporting a single consignment of 26113 tonnes of alumina from its captive port facilities at Visakhapatnam.

Valued at Rs. 15 crores, the shipment was despatched on August 14 to the US through Pechiney Trading.

With this, NALCO has completed exports of nearly two lakh tonnes since January 1988. During the period, the company has earned foreign exchange worth Rs. 50 crores from alumina exports. It hopes to touch the figure of Rs. 100 crores by the end of the financial year.

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POLYSILICON PRODUCTION:

Hemlock knowhow to be used indigenously

The Centre has made it clear that the cancellation charges and other fees worth Rs. 7.92 crores which was paid to Hemlock Semi-conductor Corporation of the US for polysilicon technology will not go waste.

In reply to a question in the Lok Sabha, the Minister of State for Science and Technology and the Department of Electronics, Mr. K. R. Narayanan, said the technical knowhow, process design, standard operating procedures and material requisition documents that India received from Hemlock for the production of polysilicon would be indigenously used for the development of technology, especially electronic grade.

Although the application areas have not yet been worked out and discussions are still on at the highest level, official sources said the Hemlock technology in all probability, would be optimally utilised in the advanced sectors like space and defence purposes.

The country had entered into a deal with Hemlock in 1985 for the development of polysilicon technology along with know-how transfer.

However this led to a long-drawn controversy as certain officials had had failed to assess the indigenous technological developments.

Metkem silicon of Mettur Chemicals had done pioneering work in the field and the technology and product was found to match world standards. The deal with Hemlock was finally cancelled in 1987 to give a pep to domestic know-how at a fractional cost.

However, the Metkem technology is suitable for solar-grade polysilicon which finds applications in photovoltaic cells.

Metkem has a capacity to produce 25 tonnes of polysilicon at present. Another two companies are producing about 15 tonnes. One tonne of polysilicon yields 50,000 of silicon wafers, the final product.

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Efforts are on to increase the pro tion capacity by pumping in mor vestment to meet the domestic den

---

MCA PROJECT:

SC RULES IN FAVOUR OF MODI

The Supreme Court has turned the plea of monochloro acetic (MCA) manufacturers that the be restrained from implementing Rs. 180-lakh MCA project at Alw Rajasthan.

Eight MCA manufacturers had jected to the proposal of Modi Al and Chemicals Ltd. to set up a tpa plant. Their objections had been turned down by the Monop and Restrictive Trade Practices mission (MRTPC). The Supreme upheld the MRTPC ruling.

The MCA manufacturers object the proposal on the ground that a house like the Modis ought not ter this field where medium-size small-scale units are already stru to sell the product because of s demand. The bulk of MCA is cap consumed, and trading is only i region of 2,500-3,000 tonnes, ac ing to industry sources.

The existing units together hav und 10,000 tonnes of installed ca ty. There are four manufacturers organised sector and six small units, out of which three are und sick list and are beneficiaries of ernment's nursing schemes. The tion of fresh capacity, therefore, justified, they told the court. A objection was that the Modis we ing in for foreign technology.

The Modis argued that demar MCA is bound to increase becau the growth in the consumption of based weedicides, pesticides and chemicals. Also, MCA had expo tential. It attributed the under-u tion of existing capacity to "inad technology."

The company will reportedly p 2 crores for purchase of foreign nology. The Regional Research tory of Hyderabad had expresse inability to provide the technolog ght by the Modis and hence the

NEWS IN BRIEF

NOCIL CLARIFIES ON ALLEGED TAX EVASION

National Organic Chemical Industries (NOCIL) has in the wake of press reports alleging excise duty evasion by the company clarified in a statement that is has an obligation to supply ethylene to Polyolefin Industries Ltd. (PIL), its sister concern, under an agreement and these supplies are made at the contracted price. It has been filing its price list with the excise authorities. The agreement incorporates also the price escalation factor.

NOCIL has further clarified that PIL is a bulk customer and has made large investments depending on ethylene supplies from NOCIL. The marginally higher price negotiated with other customers like Polychem is mainly due to the small volume of their offtake and mode of delivery, the statement says. NOCIL further says it has not evaded excise duty since it recovers whatever duty it pays to the government from PIL which in turn gets corresponding modvat credit.

SC ISSUES NOTICE TO UNION CARBIDE

The Supreme Court issued notices to the Union Carbide India and its parent organisation in the USA — the Union Carbide Corporation — on a miscellaneous civil petition seeking a direction to them to disclose all information in their possession accumulated during more than 20 years of research on the effect of MIC gas.

The court also issued notice to the Madhya Pradesh government on a prayer in the petition seeking continuation of supply of ration including milk and sugar to the gas victims which was reportedly stopped after 13 months of the 1984 tragedy.

The notices were issued by a division bench comprising chief justice R. S. Pathak, Mr. Justice M. H. Kania and Mr. Justice L. M. Sharma after preliminary argument on the petition.

The petition is an offshoot of a writ petition filed by Dr. Nishit Vohra seeking a direction to the Madhya Pradesh government to provide correct line of treatment to the gas victims and rehabilitate them by providing jobs according to their health status.

The court granted four weeks time to the Union Carbide India and the Union Carbide Corporation of the US to file their replies.

Similarly the Madhya Pradesh government was allowed two weeks to file its reply.

IS STANDARDS: HDPE WOVEN SACKS FOR PACKING FLOUR

Bureau of Indian Standards has brought out an Indian Standard Specification for High Density Polyethylene (HDPE) Woven Sacks for Packing Flour (IS: 12100-1987). It prescribes requirements of two types of HDPE Woven Sacks. Type 1 will be suitable for packing flour in the nominal capacity of 20 kg and 50 kg and Type 2 for packing in the nominal capacity of 5 kg and 10 kg.

There is extensive use of HDPE Woven Sacks for packing flour within the country. It is expected that with the use of the bags conforming to this specification, the wastage of flour during various stages of handling would be prevented considerably.

NOTED BIOCHEMIST DEAD

The internationally-known biochemist, Prof. L. K. Ramachandran, died in Hyderabad recently after a brief illness.

He was the former head of the biochemistry department of Osmania University. He was 60.

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Laser Technology in Chemistry

A recent issue of Applied Physics (1988, B46, No.3, July, p.197-282) gives highlights of remarkable developments in laser technology with reference to its impact on chemistry. Laser spectroscopic techniques provide new means for a detailed understanding of chemical reactions. New diagnostic techniques allow combustion reactions to be studied. Laser-induced reactions have some unique features and isotope separation is practical. The isomerization of carvone to carvone camphor may be cited as an example.

IR laser spectroscopy allows in situ monitoring of ammonia in power plants for combating nitric oxide. The model indicates that rapid mixing of NH_3 with flue gases is essential to obtain optimal reduction results. The application of planar laser induced fluorescence gives access to a study of turbulence in reactors. Lasers have also been used in genetic engineering.

The laser isotope separation is receiving increasing attention; an early example was 10 BCl_3 and 11 BCl_3. Carbon isotope separation has been realised. UV laser ablation of polymers may prove to be technologically beneficial. Laser induced reactions at or near surfaces can carry out ingenious modifications of surfaces.

Loop Reactors (LR)

Dierendonck **et al.** have discussed scale-up aspects of LR, which are very useful for conducting a variety of gas-liquid reactions, such as, hydrogenation, chlorination, ethoxylation, etc. Heat transfer problems can be handled easily as the heat exchanger is external to the reactor whose key feature is a well designed venturi. The scale-up is based on a constant power input per unit venturi volume, while the pump capacity is derived from the rule of a constant recirculation time. LR can offer k_La values as high as 1 sec^{-1} and are particularly good for fast reactions operated under pressure. (Paper presented at the 6th European Conference on Mixing, May, 1988, Pavia, Italy; Proceedings, p. 287).

A new strategy in extractive distillation

A new solvent, based on the use of aqueous solution of hydrotropes, has been proposed which allows good values of relative volatility to be realised with such close-boiling mixtures as 2,6 xylenol-p-cresol. For acidic mixtures solutions of alkanolamines also act as good solvents (*Sep. Sci. Technol.*, 1988, **23,** 429-436).

Asymmetric halogenation (AH) and hydrohalogenation of styrene

Sakubara and Ishizaki have studied AH of styrene in microcrystalline cyclodextrin complexes (CDC), both in gas-solid and in aqueous or dimethyl sulfoxide systems. In the case of the gas-solid brominations in the alpha- and beta-CDC (-) -1,2 dibromo-1-phenyl ethane was predominantly produced; the alpha variety gave chiral induction 9 times that of the beta variety. By contrast, brominations in the homogeneous medium containing both alpha- and beta CDC's gave no dibromide but racemic bromohydrin (*J. Inclusion Phenomena,* 1987, **5,** 449).

Stereospecific epoxidation by air of cholest-5-ene (CE) derivatives

Marchon and Ramasseul have shown that a Ru porphyrin catalyst catalyses the epoxidation by air of several CE derivatives in high yield and with nearly complete B-stereo-specificity (*J.C.S.Chem. Commun.,* 1988, 298).

Ru catalyst for cycloolefin preparation

Sumitomo Chem. Ind. have claimed that partial hydrogenation of aromatic hydrocarbon can be performed with Ru and P oxoacid salts. (Jap. Patent. Appl. 62/142, 126, *Cf Platinum Metals Rev.,* 1988, **32, 103).**

Oxidation of ammonia to nitric oxide—a new thin layer lattice catalyst

A USSR patent claims tht a twin layer lattice catalyst, where lattice-1 contains Pt, Rh and optimally Pd, Ru: and lattice-2 contains Pd, Au, and option-ally Pt, Rh, Ir, Co and/ or Ag, requires less Pt and at the same time the loss of the noble metal (i.e. Pt) is reduced by 65% with hardly any effect on NH3 conversion (Platinum Metals Rev., 1988, 32, 104).

Sorbitol using Ru hydrogenation catalyst

Pfizer have claimed that a two-stage hydrogenation of hydrolysed starch gives complete conversion. Here for the first stage, after acidification, Ru catalyst is used at 100-180°C and 35-140 atm. (U.S.P. 4, 694, 113).

Synthetic methods and reactions

Surya Prakash and Olah have given an excellent account of the development of a series of reagents and reactions for organic synthesis based on simple raw materials. The use of nitronium and nitrosonium salts and related reagents as nitrating agents, pyridinium polyhydrogen fluorides as a halogenating agent, solid superacid catalysts for Friedel-Crafts reactions, oninum ion and carbocation salt reagents, etc. is discussed. (*Proc. Indian Acad. Sci. (Chem. Sci.)*, 1988, **100, 143**).

Liquid phase methanol process

Air Products have put up a pilot plant of 5 tpd capacity where a mineral oil is used with a commercial copper powder catalyst where the product CH_3OH comes out as vapour. The specific advantage of the liquid phase is that it can operate with H_2: CO ratio of 0.7:1, unlike the vapour phase process which requires the ratio of 2:1; such a lean gas comes from coal gasification processes. (*Chem. Eng.*, 1988, **95**, No.9 (20 June), p. 27).

Homogeneous catalysis for agrochemicals, flavors and fragrances

Parshall and Nugent (of Du Pont, U.S.A.) have given a fascinating account of this subject with practically relevant examples. Pyrethroid insecticides — Permethrin — relatively high *cis-* and *trans* ratios are found with dimeric rhodium (II) carboxylate catalysts like those used in the thienamycin synthesis. Some permethric acid derivatives have optical as well as geometric isomers. A lot of work on asymmetric cyclo-propanation catalyst has been done. Pyrethroids based on chrysanthemic acid esters are most active in the naturally occurring *D-trans* form. Homogenous catalysts have been suggested for the reaction between CCl_4 and $CH_2 = CHCOCl$ (Cu in acetonitrile medium at 115°C).

Aluminium trianilide is used as a catalyst for ort ethylation of aniline.

Phenylalanine production has started in Europe an asymmetric hydrogenation process analogus the Monsanto process for L-dopa. (*Chemtec* 1988, June, 376-383).

H_2 O_2 : Technology and business

A recent issue of Chemical Engineering (1988, 9 No.9, 20 June, p.32-37) gives an up-to-date accou of contemporary developments in technology an new markets. The recent Du Pont process for th direct reaction between H_2 and O_2 in an aqueou acidic medium containing Pd/C catalysts appear to be most attractive. Dow and Occidental have a electrolytic process, using a membrane cell, wher H_2O_2 is produced in an alkaline medium; the eff ciency of O_2 reduction at cathode is 80-99%.

The use of H_2O_2 is growing rapidly in bleaching c pulp as the process is free from pollution. New appl cations for environmental protection are: in-sit treatment of contaminated soils, detoxification c cyanide wastes, etc.

Cyclohexanone oxime (CHO) from cyclohexa none (CH), NH_3, H_2O_2

Montedipe's research has developed a new process where a highly selective catalyst allows reactio between CH, NH_3 and H_2O_2 to give CHO. Thus the Co-production of ammonium sulphate can be drastically out. (*ECN*, 1988, 4, July, p. 17).

Bioconversions of lipophilic substances by encapsulated enzymes (EE)

Biocatalysts (enzymes; microbial cells) have been made resistant to organic solvents through different approaches: chemical, biochemical and genetic. Immobilization of biocatalyst on or in suitable supports appears to be very promising. S.Fukuis group has developed convenient methods for entraping biocatalysts inside gel matrices formed from synthetic pre-polymers. *Nocardia rhodocrous* (cells) have been used in benzene (in heptane)-water system for dehydrogenation of ADD and TS. Stereoselective hydrolysis of *dl*-menthyl ester has been carried out in heptane - water with Rhototorula minuta (cells), Stereo selective esterification of *dl*-menthol has been carried out with lipase in cyclohexane-water system. (*J. Am. Oil Chem. Soc.*, 1988, **65,** No.1, 96-100).

Homogeneous Catalyst for CO_2 H_2, $(CH_3)_2$ NH reaction to DMF

Schreiner et al., have shown that Pt_2 (u dppm)$_3$ (dppm = Ph_2 PCH_2 PPh_2) catalyses under unprecedented mild conditions, in a reversible way, the reaction under reference. (*J.C.S. Chem. Commun.*, 1988, p. 602).

Reaction between Phenol and HCHO: Selectivity through cyclodextrins

M. Komiyama has reported a highly selective synthesis of 4hydroxy-methyl phenol with modified cyclodextrins having hydroxypropyl residues. Para to ortho isomer ratio of 15.7 has been realised. (*J.C.S. Chem. Commun.*, 1988, 651-652).

Enzymatic oxidation of cholestrol aggregates in supercritical (SC) CO_2

Blancn, Prausnitz and co-workers have already reported the use of SC CO_2 in conducting enzymatic reactions. Cholestrol oxidase has been found to be active in SC CO_2 and SC CO_2-co-solvent mixtures. Variations in solvent power caused by pressure changes or by the addition of dopants affected the rate of enzymatic oxidation of cholestrol by altering the structure of cholestrol aggregates. (*Science,* 1988, **239, 22 Jan., 387).**

Catalytic hydrogenation of triglycerides

It has been claimed that catalysts, containing Cu, Cr, Ba, etc., give on hydrogenation of triglycerides (e.g. coconut oil) high yields of fatty alcohols and 1,2 propanediol. (Ger. Offen. 3,624,812, 1988, *Cf. Chem. Abstr.*, 1988, **108,** 223438).

Handling of Corrosive Chemicals

Plate Heat Exchangers

Alfa-Laval have introduced a new design of PHE where gaskets, which may not be able to withstand highly corrosive and aggresive materials, are replaced by welded construction. Albright and Wilson have used such a construction for an exothermic reaction and this has allowed the batch time to be halved. Hastelloy C276 plates were laser-welded. (*Processing,* 1988, April, p. 13).

Flue Gas Desulphurization (FGD)

BASF in W. Germany have an FGD unit based on the Wellman-Lord process which uses a GRP contactor, 9.4 m dia. and 35.5m high. Here aqueous sodium sulphite is used as an absorbent; pure SO_2 is obtained as the product. A vinyl ester (of BASF make — PALATAL A 430) is used.

Du Pont fluoroelastomers are also very useful for lining of steel. (*Processing,* 1988, April, p.30).

Plastic Heat Exchangers (PLHE)

At Elektromark AG power plant in Hagen, West Germany, a PLHE — made of PTFE, PVDF and perfluoroalkoxy co-polymer, has been found to be absolutely corrosion resistant in an FGD plant. Due to antistick quality of polymer, the fly ash build-up is about 10% of that in a metal HE. (*Chem. Eng.*, 1988, **95,** No.5, May, pp. 17-23).

Ion Exchange Resin (IER) catalysed reactions

Decomposition of tert amyl methyl ether (TAME)

Erdolchemie have claimed that SiO_2 — modified Lewatit SPC 118 strongly acidic IER allows TAME, with water, to be decomposed to methanol and iso-amylene (2-methyl-1- and 2-methyl-2-butene) at 363 K at high levels of conversion and yield (Ger. Offen. 3, 610, 704, Oct. 1987, *Cf. Chem. Abstr., 1988,* **108,** 186161).

Tetraisobutylene (TIB) from diisobutylene (DIB)

Erdoochemie have claimed that a macroporous cationic IER with zeolites of 3A allows DIB to be converted to TIB. (Ger. Offen. 3, 612, 443, Oct. 1987, *Cf. Chem. Abstr.*, 1988, **108,** 186162).

Hydroformylation (oxo/reaction) of vinyl chloride (VC)

Mitsui Toatsu have claimed that VC, with CO and H_2, gives MeCHCl CHO with rhodium phosphine ligand at 55 Degree and 85 atm pressure. The oxidation of chloroaldehyde gives the corresponding acid which in turn on hydrolysis gives lactic acid

(J.P. 62, 273, 935, Nov. 1987, *Cf. Chem. Abstr.*, 1988, **108,** 186169).

Oxidation of organic compounds with hydroperoxides

Muller and Idmoumaz have shown that $RhCl(PPh_3)^3$ and Rh^+ (diphos) catalyse oxidations with tert butyl hydroperoxide. Thus anthracene is converted to anthraquinone; 1-phenyl ethanol to acetophenone etc. It is interesting that terminal olefins are converted to the corresponding ketones but the internal olefins are unreactive (*J. Organometallic Chem.*, 1988, **345,** 187).

Oxidation of unsaturated fatty acids (UFA)

Zaidman **et al.** have shown that $RuCl_3$ catalysed sodium hypochlorite oxidation in a two-phase, emulsified, system gives high yields of azeleic and pelargonic acids. Emulsification helps in improving rates. Azeleic acid can be recovered by extraction with hot water and subsequent crystallization (*J. Am. Oil. Chem. Soc.* 1988, **65,** No.4, 611).

Thermoplastic Elastomers (TPE)

TPE continue to attract world-wide attention and show good growth. For automobiles and other applications TPE offer tremendous economic advantage over the traditional multistep thermoset rubber process. TPE offer a unique opportunity for design flexibility in automotive applications. Prime examples of some of the growth areas for thermoplastic olefins are flexible covers and sight shields. The new TPE alloys are gaining importance. (Wright, M.A., **et al.,** *Chemtech.*, 1988, June, p. 354).

A novel absorbent for nitrogen

Japan Oxygen Co. have claimed that (Fe H (dppe)2-) + Y-where Y = BPh_4- or ClO_4, and acetone or pyridine or ammonia or PhCN or MeCN, reversibly absorbs nitrogen. Thus pure nitrogen and enriched oxygen can be simultaneously produced (JP 6342, 717, Feb. 1988, *Cf. Chem. Abstr.*, 1988, **109,** 8921).

Transesterification of fats

KaO Corpn. has claimed that molten fats (e.g. Palm Oil) can be transesterified (e.g. with stearic acid), without a solvent, in the presence of thermally stable lipase at 60°C. (E.P. Appl. 257, 388, *Cf.* C *Abstr.*, 1988, **109,** 8381).

Alkoxylated esters from alcohols and uns ated esters

Union Carbide have claimed tht (for instance) anol reacts with ethyl acrylate, in the presen a strongly basic ion exchange resin DOWEX-M 1, to give Et-3-ethoxy propionate (E.P. Appl. 291, *Cf. Chem. Abstr.*, 1988, **109,** 8399).

Effect of surface roughness on solid-liquid m transfer coefficient

Van Vliet and Young have studied the effect of face roughness on the value of the external r transfer coefficient and have found a prof effect; the enhancement factor appears to b high as 8 in some cases. Any surface rough which is significantly smaller than the diffusior thickness is unlikely to have an effect. The su roughness can be studied through the conce fractal dimension. Mass transfer was carriec through absorption of species like phenc chlorophenol/dodecyl benzene sulphonates adsorbent like activated carbon, polymeric ma als, etc. (*Chem. Eng. Comm.*, 1988, **69,** 81-

4A Zeolites from calcined kaolins for us detergents

Costa **et al.** have shown that 4A zeolite ca made by calcination of Kaolins. Experiments carried out in 1 liter and a pliot plant 50 liter r tors; gels were prepared by dissolving pretre Kaolins in an NaOH solution. After ageing the were heated to the desired crystallisation condit At a capacity of 30,000 tpa the cost of produ under conditions in Spain, works out to be $0.4 (*Ind. Eng. Chem. Res.* 1988, **27,** 1291).

Catalytic membrane for simultaneous reac and separation: Dehydrogenation reaction

Sun and Khang have shown that a vycor membrane reactor, impregnated with a Pt cat can be successfully used for a dehydrogen reaction — cyclohexane to benzene. Here the meation of the product allows conversion to ex equilibrium conversions under conditions when duct(s) is (are) not removed. Strong internal transfer resistance exists in this reactor (*Ind.* *Chem. Res.*, 1988, **27,** 1136).

IBRD cautions ONGC on output levels

The Oil and Natural Gas Commission (ONGC) has recorded significant increases in productivity in all areas of its operation over the period 1980-81 to 1987-88. Yet the World Bank has warned that it may be difficult to maintain production levels because the rate of exploitation has been greater than the rate of discovery of fresh oilfields.

ONGC sources argue "that a slight overstrain on the system yields better results than aiming for lower targets". But the World Bank maintains that India's energy-wasteful strategy of development is running out of the domestic petroleum necessary to sustain it.

The Bank's just published confidential report for 1988 notes critically that energy use has grown faster than gross domestic product (GDP) by a factor of 1.2 to 1.5.

"Discoveries of oil reserves have not kept pace with the increase in domestic oil production in the last few years. The Bombay High Oilfield, which accounts for about 70 per cent of India's domestic oil production, has now reached a production plateau. In the years ahead, its production is likely to decline. Crude oil production has virtually stagnated since 1985", says the report.

According to ONGC sources, oil production per employee increased from 327 tonnes in 1980-81 to 644 tonnes in 1987-88, registering a 97 per cent increase. The leap in productivity reflected in the gas sales per employee was even greater, showing a 293 per cent increase.

But the greatest increase in productivity is evident in the figure for the production of LPG. During this period LPG productivity registered a 356 per cent increase.

Drilling performance, expressed in metres/rig months, is termed "cycle speed". During the period 1980-81 to 1987-88, the cycle speed increased from 475 to 675 metres/rig months.

Gains in productivity are reflected in the financial performance of the organisation. The profit after tax has swollen from a mere Rs. 46.57 crores during 1980-81 to Rs. 1,505 crores in 1987-88.

ONGC COPTER PLUNGES INTO BAY

A helicopter chartered by the Oil and Natural Gas Commission (ONGC) with ten people aboard, reported missing at sea has crashed into the Bay of Bengal, an ONGC spokesperson said on August 13.

The fate of the two pilots and eight passengers is not known.

A massive search for them has been launched by Indian Navy ships, Air Force aircraft, the Coast Guard and ONGC supply vessels.

An Indian navy ship on the search and rescue mission found the debris of the helicopter about 16 km east of Pondicherry, a navy spokesman said in New Delhi.

He said the ship had spotted one life raft, two seats and other pieces of wreckage of the aircraft, which was chartered from the Pawan Hans Corporation and was on offshore duty for ONGC.

The Dauphin helicopter which had taken off from Madras on Aug. 12, made several trips to the 'Badrinath' platform and the ONGC drilling ship 'Sagar Prabhat'.

Soon after it took off from 'Sagar Prabhat' around 1500 hrs. on Aug. 12, the ONGC radio base at Madras lost contact with the aircraft, the ONGC spokesperson said.

Apart from the two pilots, the eight people on board were employees of Scan Drilling Company, Flow Petrol, Schlumberger, Fairmax Catering Service and Interads — hired by ONGC for its offshore operations, he said.

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Petrochem prices stabilise

Petrochemical prices, which have been on the ascendant for years, have now peaked and plateaued.

Industry sources attribute the development to consumer resistance. Also, ethylene supply is easing as explosion-hit plants in the US and Europe are being reactivated. Japan has demothballed its old plants, effecting a marginal increase in supply.

Though prices of all ethylene derivatives have peaked and a reversal is evident, a steep fall in prices is most likely and prices of petrochemicals are expected to stabilise in the region of $ 1,200-1,400. industry souces said.

Monoethylene glycol (MEG) prices the most volatile of all petrochemicals, had touched $ 1,900 a few months ago. It has now stabilised at around $ 1,750. Contract supplies are even today being effected at $ 1,250.

Polyvinyl chloride (PVC), which had peaked to $ 1,320 per tonne, has now come down to $ 1,280. Low density polyethylene (LDPE), quoted at $ 1,585, is now available at less than $ 1,500 a tonne. High density polyethylene (HDPE) has fallen from $ 1,650 to $ 1,400 and is dropping further. Even ethylene, which is no longer traded in the international market, is expected to be available by 1990.

In erecting new petrochemical complexes, the trend abroad now is to serve the needs of the country, and not the export market. This is said to be because of the uncertainty over the continuance of long-term export markets. "The rule of thumb is that investment for export are justified only if there is an assured market which could fetch 30 per cent more than the domestic prices," an industry source said.

As summer is tapering off, demand for gasoline in the Western world is declining. Crude prices have dropped to $ 13 a barrel. The downtrend is expected to continue as both Iran and Iraq will pump as much oil as possible in their endeavour to rebuild their war-shattered economies.

Industry sources welcomed the Government's decision to allow one and all to purchase polymers from the world market, for actual use or sale. "Irrespective of the reason which
have prompted the Government to
this decision, it is in the country's
terest. India should take this op
tunity to maximise its purchase
crude as well as petrochemicals,"
industry source commented.

RPL GETS NOC FROM GUJARAT POLLUTION BOARD

The Gujarat Pollution Cor
Board gave a no-objection certifi
(NOC) in January 1987 to Relia
Petrochem in Hazira for three proje
They are the HDPE and PVC pl
and the setting up of a captive pc
unit. The board has no objection
from the pollution point of view
no other.

Reliance has yet to get clear
from the environmental appraisal c
mittee of the ministry of environm
Central government, where all envi
mental questions pertaining to the
ject are to be discussed. Incident
this committee meets every month
the Reliance discussion has not
scheduled so far. The Gujarat P
tion Control Board is also a part
the committee's discussion if the
ject concerned is in Gujarat.

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Natural gas discovered in western Rajasthan

Oil India Limited announced its first major discovery of hydrocarbons in Rajasthan where it started looking for oil and gas some three years ago. The first exploratory well drilled by the OIL technicians at Tanot, 115 km north-west of Jaisalmer, has yielded gas accumulations. The hydrocarbon content, including methane and significant amounts of ethane, propane and butane, in the produced gas is about 67 per cent.

The Tanot well, first in a series of six wells to be drilled in western Rajasthan by the OIL before March 1990, was spudded on March 8 and reached its planned depth of 3,513 metres on July 1. Production testing began 15 days later after detailed down-hole surveys and cementation of casing pipes.

During production testing of a promising zone at a depth of 1,950 metres, the rate of flow was a steady 16,000 standard cubic metres (1.6 million standard cubic feet) a day through a six mm beam. Its flowing pressure on the surface was 1,210 pounds a square inch (87 kg/sq. cm). The open flow potential is estimated at over 100,000 standard cubic metres (five million standard cubic feet) a day.

Optimistic

The geological reserves of the gas struck in well No. 1 at Tanot are estimated at one billion standard cubic metres (35 billion standard cubic feet). The OIL experts are optimistic that drilling in the adjacent structures might lead to the discovery of larger quantities of gas in the Tanot area.

It was in 1985-86 that the OIL carried out the first intensive seismic survey using the vibrosis technique along 8,100 km line covering the entire petroleum exploration area of 28,600 sq. kms licensed to it in Rajasthan. The data was processed at a computer centre set up at Jodhpur.

A comprehensive analysis and interpretation of the data together with the available geological information by three different groups headed by reputed geo-scientists has led to the identification of six drilling targets. The

OIL has retained 10,000 sq km of the area licensed to it for exploring hydrocarbons.

After Tanot, the second exploratory well would be drilled near Ramgarh, about 80 km from well No. 1. The second well is expected to be spudded later this month.

The sanctioned expenditure on the drilling phase is about Rs. 51 crores, which the OIL hopes to utilise during the Seventh Plan period. The cost of the survey phase of the project completed earlier has been Rs. 31 crores. The foreign exchange component of th OIL's Rajasthan project is being funded through a World Bank loan. The tentative allocation is $25 millions (about Rs. 33 crores).

HALDIA PETROCHEM PROJECT COST SOARS

The cost of the Haldia petrochemicals project, which has been dogged by delays in decision-making, has escalated to Rs. 2,000 crores.

This information was given by the Union Industry Ministry, Mr. J. Vengal Rao, while replying to supplementaries on a question on polymer imports raised in the Lok Sabha by Mr. Saifuddin Chowdhury.

Mr. Vengal Rao said all the clearances needed to be obtained from his Ministry have been given and the project promoters need to get other financial approvals.

In reply to the main question, the Minister admitted that there would be shortfall in the demand and availability of polymers in the country beyond 1990. According to him, the shortfall in 1990-91 would be 368,000 tonnes as the production would be 490,000 tonnes against a demand of 858,000 tonnes.

The Minister also assured the member that steps are being taken to expedite the setting up of new petrochem projects in the country.

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ONGC output may exceed target

The Oil and Natural Gas Commission is likely to achieve production of nearly 144 million tonnes against the original target of about 143 million tonnes during the Seventh Plan, ONGC sources say that this estimate is based on the achievement of targets in the first three years of the Seventh Plan, which has been cumulative 82.1 million tonnes against which ONGC achieved 83.28 million tonnes.

Col. S. P. Wahi, chairman, ONGC, said that the increase in production was largely due to the new oil and gas discoveries, accelerated build-up in reserves, innovative strategies adopted for putting these discoveries into production through the early production systems and enhanced oil recovery scheme.

He said that a notable feature of the Seventh Plan had been a build up in the geological reserves which is also a reflection of the intensification of its exploratory activity during the Seventh Plan. As against a target of 970 MMT reserve accretion during the plan period already 823 MMT of oil and oil equivalent of gas had been added in the first 3 years of the Seventh Plan (1985-88).

ONGC is reviewing its targets for the Eighth Plan, keeping in view the large number of discoveries, made in the recent past, both onland and offshore. As per the existing plan, the cumulative production for the Eighth Plan is expected to be about 280.7 million tonnes of oil and oil equivalent gas.

The all round gains in productivity is amply reflected in the impeccable financial performance of the organisation. The profit after tax has swollen from a mere Rs. 46.57 crores during 1980-81 to Rs. 1505 crores in 1987-88.

With the government equity remaining at the level of Rs. 432.85 crores since 1981, the financial resources for development and growth year after year have been primarily met through internal resources generation and commercial borrowings. The total internal resources generation during 1987- has been Rs. 2209.49 crores wh is 107 per cent of the plan expen ture.

Reacting to the charge of "indiff ence" towards indigenisation of equ ment Col. Wahi said that a large nu ber of capital items were already be manufactured and supplied by the co panies in the public and private sec to ONGC.

In fact, he said, it was estima that the domestic industry was to supplying more than 50 per cent of oil sector's requirement of equipm and materials like rigs, offshore pl forms, offshore supply vessels, cas pipes, oil field chemicals and ceme

Mazagaon Dock Limited has so fabricated 30 offshore platforms ONGC and 34 onland rigs ha been supplied by BHEL. Likewise, offshore supply vessels in operation ONGC have been manufactured by dian yards. BPCL and PIL are curre ly engaged in executing 46 cem units for ONGC.

Services worth Rs. 309.52 cro were indigenised during the year 19 87, compared to the figure of 1984- when services worth Rs. 276.32 c res were indigenised.

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4 FLOAT GLASS UNITS PLANNED

The Union Minister of State for dustries, Mr. M. Arunachalam, said cently that it was proposed to s four float glass industries at a cost Rs. 200 crores each.

Two industrial units, including T mil Nadu Industrial Development C poration (TIDCO) had applied for l ences, he told newsmen in Madura

Mr. Arunachalam said 1640 s units had been revived in Tamil Na since the President's rule came i effect.

Mr. Arunachalam said 100 distr industrial growth centres at a cost Rs. 2,500 crores would be set up the country.

Talking about the Government's e forts to accelerate the industrial grow th in Tamil Nadu, Mr. Arunacha said till the end of 1987, 122 letters intent were given by the Centre setting up industries. It worked out 12.3 per cent of the total share such letters of intent extended all the country.

Plan panel stress on natural gas use

The Planning Commission has emphasised the need for taking expeditious decisions on use of natural gas for power generation, increasing the outlays in the States' sector and streamlining of the approval system to meet the anticipated shortage of power in the Eighth Plan.

This follows a recent exercise carried out by the Commission which has shown that the electricity generation requirements will be 524 billion units for a Eighth Plan GDP growth rate of seven per cent, 480 billion units for a growth rate of six per cent and 460 billion units for a growth rate of 5.5 per cent.

A more detailed exercise on the basis of a GDP growth rate of six per cent has indicated that after taking out the expected generation of about 25 billion units from captive power, the generation requirements from public utilities will be about 455 billion units.

Against this, the gross generation, after an addition of 38,000 mw capacity during the Eighth Plan, is estimated at about 410 billion units.

The Commission feels that it may be possible to step up this generation to about 450 billion units provided a time-bound action plan is taken up for improving the performance and productivity of the existing units, operation of the power system and reduction of the time required for bringing the new units to full load operation.

The small overall gap between demand and availability may be met by getting power from Chukha and through other measures though there may still be gaps in certain regions.

However, to meet the peaking requirements, a capacity of over 4,000 mw will be required in addition to 8,000 mw for the six-per cent growth rate. This does not seem to be in sight and it is presumed that the peaking shortage will continue.

The Commission, therefore, feels that a capacity of 38,000 mw is the minimum required for the Eighth Plan. So far, a capacity of 22,345 mw has been approved for the Eighth Plan.

However, out of this, only 19,385 mw capacity is under implementation at present. A capacity of 2,570 mw is held up due to forest and environmental clearance and another 390 mw for want of delays in foreign tie-ups.

The rest of the capacity of 15,800 mw is yet to be approved due to various reasons. A capacity of 8,700 mw is awaiting forest and environmental clearance and 2,000 mw, the Public Investment Board's and Cabinet Committee's approval. Another 900 mw capacity is held up due to fund constraints, 700 mw due to inter-State disputes while 3,400 mw capacity projects are still under formulation.

The Commission also feels that several projects are likely to slip over to the last year of the Eighth Plan or to the start of the Ninth Plan because of the long gestation period involved.

As such, the Commission has stressed it is important that short gestation period projects, which could be based on natural gas are taken up immediately. Already 2,400 mw of gas-based power projects are under formulation. In addition, the Commission has found that about 4,000 mw capacity power plants could be set up, based on the natural gas available in Hazira, Gandhar, Tripura, Assam and Krishna-Godavari.

However, the Commission has pointed out that it is necessary to take a policy decision on utilisation of natural gas for power right now so that these projects could be taken up within the next six to 12 months. Such a decision will ensure that the new capacity of Plan comes up and the possible slippages to the tune of 1,600 mw are also taken care of by the gas-based power projects.

Regarding the funding of the power projects which are to materialise during the Eighth Plan, the Commission feels that there is not much problem in case of Central sector projects as only a small increase in the net budgetary support would be required next year after utilising external assistance and market borrowings.

In case of the States, however, an increase of Rs. 1,261 crores is required in the Seventh Plan outlay. This would require larger institutional funding and allocation by States of a larger percentage of their Plan outlays to the power sector.

As such, the Power Finance Corporation, may have to be allowed higher equity to have a larger borrowing programme.

The Commission also feels that it would be necessary to take measures for streamlining the various other approval systems connected with the implementation of power projects, their implementation and management power systems operations. These measures, along with a decision on pending projects would be necessary to ensure that full benefits are realised in the Eighth Plan.

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New energy policy debate

The role of hydrocarbons in the new energy policy, productivity achieved by the Oil and Natural Gas Commission and the programme of indigenisation of equipment by the industry are the three areas around which most of the controversies or debates take place reports Kumar Ketkar in **The Economic Times**:

The debate became particularly sharper with more and more gas discoveries and large scale flaring of gas. Whether gas should be used for petrochemicals (including fertiliser) or for power was one major aspect of the debate. The second related to the question of productivity vis-a-vis prognosticated reserves. Just as the ONGC's activities were expanding, the public and private sector industry began to raise questions concerning indigenisation. They legitimately feared that the worldwide slump in the international equipment market, the local units would be sidelined and the ONGC would go for massive import.

The debate is unlikely to be resolved easily.

Ever since the first oil crisis in the mid-seventies, the basic tenet of India's energy policy had been to treat coal as a primary source of energy. The first natural reaction was to substitute coal for other fuels wherever possible. Since this policy was pursued for the power generation sector also, the share of coal as a primary source of energy increased.

But during the last seven years perceptions began to change rapidly, mainly because the ONGC suceeded in increasing the oil production three-fold, from 9.21 million tonnes to 27.91 million tonnes. The gas production increased from 970 million cubic metres to nearly 6,000 million cubic metres, i.e. more than six times.

According to a report prepared by the Bureau of Industrial Costs and Prices, the new energy policy has to mean moving towards utilisation of hydrocarbons as a source of energy in the power generation. According to BICP, this will not only reduce costs but also will require much less capital resources in the coming plans for creating additional capacities in the power sector and also in the transportation sector. The BICP report says
source could be fuel oil, natu
domestic or imported.

It is at this point that the
on "options" has become sharp
India continue to import, par
when the oil experts fear sharp
oil prices again. Wouldn't prop
sation of the hyrdocarbon
limit the import? Hadn't India
its objective of near-self-suffic
the end of the century?

The BICP study argues that
will have to be substantially de
on imports of hydrocarbons for
years to come. Naturally, the c
er price for hydrocarbons will
be based on import parity price
ing the special costs of imports
prices will also define the li
the domestic coal prices at p
as well as consumer level.
means, if the new energy polic
commended by BICP is accepte
CIL will have to be given full f
to price its output, instead of a
tering the price.

In other words, the BICP is
ting going away from the pres
ministered price scheme in the
sector to a "regime of efficienc
that encourages optimum in
substitution while minimising th
energy supply costs to the econ

According to BICP the direct
content in the domestically pr
coal has been increasing over th
Consequently, the net direct imp
quirement of the energy sector
the proposed New Energy Poli
be lower than what the gross i
indicate. If one takes into accou
plies which the New Energy
would achieve, then even these
ergy imports may further declin
if we take into account direct
exchange balance in the energy

Additionally, the BICP argues
one takes into account the imp
placement effects through the
performance of energy sector, th
little doubt that the New Energy
would only further improve th
balance of payment position.

The strategic advantage of th
Energy Policy, according to the
is that it would create an all-in
distribution infrastructure in the
my which will enable India to e
exploitation of natural gas rese

It will also enable creation of n
pacities in power generation

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The Study further reveals that there is a technological gap in the produc- on of butyl rubber and therefore the now-how for butyl rubber is required be developed indigenously in addi- on to the upgradation and modernisa- on of the existing production route of BR. The report titled 'Rubber and ubber Goods Industry in India' repre- nts indepth study and covers all es- ntial aspects of rubber and rubber ods industry including present ins- lled capacity, production, import and port, import and export policy, sta- s of technology, foreign collabora- ons approved, list of identing agents, rld buyers, status of rubber machin- y and list of machinery manufactur- consultants offering consultancy ices for rubber and agents offer- know-how, availability of raw ma- ls, market price of rubber, the list bber and goods manufacturers and e all twenty project briefs on rub- goods items.

The Report is available from Indus- al Extension Bureau, Nanalal Cham- rs, Ashram Road, Ahmedabad 380- 9 The publication is priced at Rs. 0. per copy inclusive of packing d forwarding charges payable throu- rossed cheque/Demand Draft drawn in favour of Industrial Extension Bureau.

CALL TO WAIVE IMPORT DUTY ON RUBBER

The All-India Rubber Industries Association has called upon the Government to maintain the release price of imported rubber by STC at Rs. 17,000 per tonne by waiving the customs duty of 35 per cent or, if needed, by providing a subsidy. In a statement on Aug. 12, the association has questioned the decision of STC to raise the price of RMA-4 grade rubber by Rs. 2,000 to Rs. 19,000 a tonne (ex-Madras).

In doing so, it said, the corporation has violated the sanctity of the buffer stock scheme introduced in 1986 to stabilise the supply and price of natural rubber for the benefit of both the growers and the consumers.

The association is critical of STC messing up the release programme. According to it, the suspension of rubber release by the corporation on June 24 has led to a flare-up in local market prices to Rs. 19,250. The suspension came after STC had distributed only 23,000 tonnes against an authorisation to sell 30,000 tonnes. STC has no mandate to link the release price with the domestic market prices, the association contends.

In the circumstances, the only way to regulate the market is to waive the import duty on natural rubber currently pegged at 35 per cent.

The Government, it is pointed out, has already collected about Rs. 54 crores as import duty on natural rubber over the last three years. If the cost of imported rubber happens to be high even after waiving the duty as suggested, the Government should neutralise the increase by way of a subsidy drawn from the funds built up by the customs duty already collected.

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India may face aluminium shortage

India may face a shortage of ab- ut 50,000 tonnes of aluminium me- al during the current fiscal · year 1988-89) as against the "misplaced ptimism" of sulplus stock by the nion government. Domestic alu- ninium user industries feel, taking nto consideration the recent pro- luction trends, crippled further by he technical troubles in Nalco and ower famine faced by the smelters n the southern region, an estima- ed or even marginal surplus is un- enable.

The government's pronouncement of anticipated indigenous me- al surplus within the current fis- al and concurrent provision to al- ow imports under Open General Licence (OGL) by actual users at concessional customs duty coupled with talks of price decontrol have baffled the users, industry in general and the units in small scale sector in particular because they are already claimed to be on the verge of closure for want of raw material.

Viewing the country's present al- ninium scenario a pipuant one. he Eastern Aluminium Rollers and abricators Association (EARFA) as urged the Union steel and mines ninister, Mr. M.L. Fotedar to un- ertake for meticulous planning and rategy for maintaining and regula- ng the supply of metal to the user dustry. The association submitted memorandum to the minister cently, elaborating various aspects the demand and supply situation. The EARFA pointed out that small ale utensil manufacturers had ffered a lot due to irregular and ratic supply of metal for the past veral years. The W.B. state own- Balco had suspended all alloca- ns to SSI units since March this ar. Indal and Nalco continued to e acute power shortage and shut- ns. With Nalco suffering certain nical problems. metal availabili- as become erratic and substan- reduced. In the circumstances, scale units, numbering about all over the country had been affected and were perplexed. e units were, in fact, finding it ult to maintain their operation. current total requirement of mercial grade aluminium ingot tensil manufacturers amounted bout 60,000 tonnes per annum. this background, EARFA d Mr. Fotedar not to decontrol nium prices at this juncture. move should be prudent only should there be an actual physical surplus of metal production rather than on the basis of a marginal anticiated surplus during the current year. In its memorandum, it stated that once the price control was removed, the primary aluminium producers would take full advantage of the current scarcity conditions.

The association suggested that administrative pool prices could be a viable alternative now to costly aluminium imports. The high cost of imported aluminium could be well spread over domestic availability under the pool price system. Another viable alternative, it suggested, could be waiver of all duties on aluminium and aluminium scrap imports by aotual users. This was suggested because scrap was cheaper in the international market.

PLEA TO REDUCE IMPORT DUTY ON ZINC, NICKEL

The non-ferrous metal user industry is facing several problems due to the escalating prices of almost all metals such as aluminium, zinc, nickel and tin and the near scarcity of aluminium.

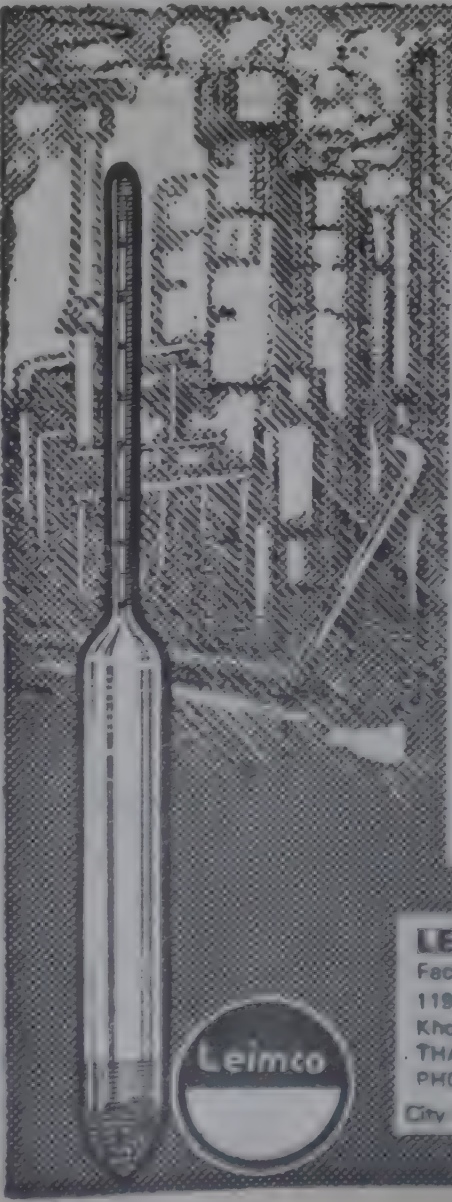
The Bombay Metal Exchange president Sevantibhai Morakhia addressing a press conference organised by the metals associations said that the government should provide relief measures to the worst affected metals such as zinc and nickel.

The government should reduce the customs duty on zinc and nickel as in the case of copper, he said.

Indian Non-ferrous Metals Manufacturers Association president Balkrishna Binani said the supply of aluminium is scarce particularly during April and June mainly due to a decline in production as a result of power shortage.

Moreover, last year's unserviced demands and backlog also have to be covered during this quarter. The requirements of user industries will have to be, therefore, adequately taken care of by planning imports in such a way that the industries would not face any shortages.

The vital but unknown factor in this year's projeotion of metal availability would be the production by National Aluminium Company (NALCO). Therefore, a very close monitoring of production performance (especially of Nalco) is required and any deviation should be made by adjusting the imports, Mr. Binani added.



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PRINT DESIG

Big houses must meet own forex needs: Vengal Rao

The Government has asked big industrial houses to generate their own foreign exchange to finance imports.

Making this declaration at a workshop organised by the Associated Chambers of Commerce and Industry (Assocham) the Union Minister of Industry, Mr. J. Vengal Rao said, "Industry will have to step up its exports efforts to meet their foreign exchange needs".

Mr. Rao further observed that the industry needed to be more competitive in view of the dismantling of regulations. Quality and price, therefore, would have to be the keywords for growth, he said.

The Minister, however, hinted that more facilities for houses are in the offing to help big houses play a better role in industrialisation. MRTP houses had not been left out of the Government's liberalisation plans, he said.

In this regard he stated that 50 more industries had been added in the list of delicensed industries for MRTP companies in October, 1987, while a scheme had been announced for maximisation of production during the Seventh Plan in April this year.

The Minister further observed that the Government's expectations looked at the big houses for getting the latest technology into the country play a role in building a dynamic industrial base.

Mr. Rao also observed that the industry needed to play a bigger role in ensuring a higher income for the rural populace as a part of an integrated strategy for promoting economic development of the country.

Mr. Rao stressed the need for developing the component industry, integrating the small-scale sector with the large sector. He said this deserved serious attention on part of the industry. He cited the example of Japan in the overall integration achieved between various sectors.

The Minister also urged the industry to generate industrial raw materials in view of the rising international prices. The cou
also to be on the lookout f
test technology so that t
sumption of raw materials
of output is reduced he
this regard, he said, t
view that the domestic
tries use more raw mate
unit of output than indus
other advanced countries.

Mr. Rao expressed his sa
at the suggestion that a 12
or more growth target in th
facturing sector could be
during the next decade.

Earlier, the Assocham
Mr. L.M. Thapar, urged the
ment to accelerate the p
liberation in such a mar
MRTP houses and FERA co
which account for a bulk o
vestment are freed from the
ed aspect of existing le
"Our licensing laws should
down size nor procedures
ports", he said.

The Chairman of Assoch
dustry Committee, Mr. G.H
ania, said the export secto
have to play a far more
role to sustain the imports
for higher growth and for
earlier debts.

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Thrust on exports to narrow deficit

e Planning Commission has call for effective measures for increa exports and containing the cur account deficit during the th Plan.

he Commission has projected with net invisible earnings of nd Rs. 4,000 crores a year and current account deficit (which d correspond roughly to the al inflow from abroad) of 1.5 cent to two per cent of GDP, annual rate of growth of imports be 9.9 per cent for a GDP th rate of 5.5 per cent.

or achieving a GDP growth rate x per cent, the projected annual of growth of imports is 10.8 cent. The import growth rate increase to 12.6 per cent annu for a GDP growth rate of seven cent.

he derived annual rate of grow of exports has been put at about per cent for a GDP growth rate 5 per cent, 15.6 per cent for a P growth rate of six per cent 7.8 per cent for a GDP growth of seven per cent.

e commission has noted that if foreign capital inflows are set o per cent of GDP, the ab amount of such flows would round Rs. 50,000 crores over five . The corresponding figure if s are set at 1.5 per cent of will be around Rs. 37,000 cro

e feasibility and sustainability nflows of this order will need e established, the Commission aid.

e Commission has pointed out n making these estimates, it sumed the import elasticity at cent on the basis of the past However, a shift away from port substituting sector would o raise the import bill fur Exports at the margin would nd to be more import-inten

growing dependence on im or meeting domestic petro requirements would tend to se the import bill.

required rates of growth of s even for a 5.5 per cent GDP n are highly relative to actual ements in the past. As such d exercises on export possi and import savings will be d to contain the balance of

in the course of the Eighth Plan, the Commission has said.

The Commission has found that the scope for increasing exports of traditional commodities like tea, coffee, unmanufactured tobacco, cashew kernels, iron ore, etc. will, be somewhat smaller in the Eighth Plan.

Larger increases will be possible in respect of non-traditional commodities like processed foods, marine products, readymade garments, leather and leather manufactures, chemicals and allied products, gems and jewellery, engineering goods, including electronics and computer software, and project and consultancy services.

A preliminary assessment of export prospects for thrust commodities made by the Commission has indicated the possibility of a growth in volume by about eight per cent a year on a sustained basis during the Eighth Plan.

This would require an annual average volume growth of over 10 per cent a year in the value of exports from selected seven non-traditional export commodities.

Further, a volume increase of around five per cent in export earnings from all other items would be needed during the Eighth Plan.

The Commission has, therefore, suggested several measures for increasing exports. These include selected imports of machinery for upgradation of technology and other additional imports required for promotion of exports, increased imports of uncut diamonds, liberal imports of hides and skins for leather exports and supply of raw materials to export industries at international prices.

EXPORTS: CONCERN OVER FALL IN INDIA'S SHARE

Recent liberalisations by the Union Government are an inevitable response to the stage of development attained by the Country's economy, said Mr. R.N. Malhotra, Governor of the Reserve Bank, addressing a United Nations Development Programme (UNDP) organised meeting with the Federation of Indian Export Organisations (FIEO).

The conclusions of the several recent UNDP meetings with Indian organisations including the Bombay Chamber of Commerce and Industry (BCCI) were discussed at the meeting.

Mr. Malhotra said that liberalisations cannot be reversed because the economy is so complex that it cannot be subjected to detailed regulations. Nobody really has all the answers, he claimed. A lot more has to be left to people who are in the field of production, exports and business.

The RBI Governor noted that India's share of world's exports had declined over the years. He lamented that the contribution of large industry which used up a great deal of foreign exchange had been weak.

Mr. Gamil Hamby, UNDP resident representative, noted that the purpose of these seminars of India organisation is to work out a strategy for direct UNDP assistance to the Indian private sector. He noted that India got the second largest grant from UNDP, next only to China. Yet India is also the largest donor to the programme of any developing country, giving $7.5 million in foreign exchange, and providing critical technical expertise for UNDP programmes.

Mr. Ramu Deora, President, FIEO, made recommendations concerning export packing credit advance, and suggested that units exporting more than 50 per cent of their production be given special credits. He asked RBI to ensure that operational officers understand certain new liberalisations.

Mr. Deora also wanted the prescribed limit of assessment and investments for small-scale industries be raised from Rs. 35 lakhs to Rs. 1 crore.

1987-88 EXCISE REALISATION RS. 16,633 CR.

The revenue realisation from Central Excise duties during 1987-88 has been provisionally put at Rs. 16,633 crores, the Minister of State for Finance, Mr. Ajit Kumar Panja said in the Lok Sabha recently.

The figures for 1985-86 and 1986-87 were Rs. 12,956 crores and Rs. 14,470 crores, respectively. The realisation during 1987-88 was 1.14 per cent less than the Budget estimate, he said in a written reply.

During 1987-88, the revenue realisation from Customs duties were provisionally put at Rs. 13,636 crores. It was Rs. 9,526 crores in 1985-86 and Rs. 11,475 crores in 1986-87.

Metals import bill to go up Rs. 400 crores

The import bill for canalised non-ferrous metals for 1988-89 would be higher by Rs. 400 crores over 1987-88.

The bill is expected to be around Rs. 1,200 crores for the current financial year against Rs. 1,000 crores last year. However, the 1987-88 bill includes Rs. 160 crores for import of 60,000 tonnes of aluminium, which has now been put on open general licence (OGL).

The steep jump in the import bill is attributed mainly to rise in prices of non-ferrous metals in the international market and partly to increase in quantity to be imported.

During the year, about 80,000 tonnes of copper is estimated to be imported at a cost of over Rs. 600 crores against 75,000 tonnes imported for about Rs. 450 crores in 1987-88, thereby, showing an increase of about 28 per cent in the international prices.

A substantial increase in quantity of zinc to be imported is also expected. As against last year when 65000 tonnes were imported, in 1988-99 it is expected to go up by 10,000 tonnes to 75,000 tonnes.

Value - wise, Rs. 225 crores have been earmarked for import of 75,000 tonnes. Last year, Rs. 200 crores was spent for imports.

During the first four months of the current year, 19,804 tonnes of copper valued at Rs. 131.79 crores has already been imported against 21,828 tonnes valued at Rs. 105.89 crores imported during the same period last year.

A close loow at the figures clearly, indicate the marked rise in international prices.

Similarly about 20,341 tonnes of high-grade zinc has been imported valued at Rs. 75.81 crores during April-July period against 12,254 tonnes valued at Rs. 37.30 crores during the same period of last year, thereby, indicating 18 per cent rise in prices.

However, in the case of lead the picture almost remains the same. This year about Rs. 40 crores has been earmarked to import about
24,000 tonnes which corresp
the figures of last year.

But, for the four months
the figures available here
the rise in international pr
this metal also. For instan
ing the first four months of t
about 9,111 tonnes of 99.97
lead valued at Rs. 20.34 cr
been imported against imp
10,275 tonnes for Rs. 16.73 cr
ring the same period last ye
reby, showing a phenomen
of 26 per cent in the inte
prices.

However, according to of
urces, the rates of non-fer
tals in the international mar
tuate frequently. Hence it is
to estimate the prices until
is finally struck.

Also the estimates of the
ports are on conservative b
do not fully take into acc
expected fluctuations in
national prices.

In the case of nickel, ab
5,000 tonnes is estimated to
ported and Rs. 106 crores
earmarked for the purpose.

However, during the fir
months, 1,517 tonnes of nic
ed at Rs. 54.08 crores has
ported compared to import
tonnes valued at Rs. 19.63 cr
if the four months figures
indication, the prices of n
the international market ha
by 66 per cent.

DUTY ON ALUMINIUM I
REDUCED

The government has no
reduction in the basic rate
toms duty on aluminium ing
Rs. 1,000 per tonne to Rs.
tonne.

The reduction in the d
has been made keeping in
current international and
prices of aluminium. The d
ture of aluminium and de
products have also been

A uniform rate of bas
duty of 18 per cent ad val
been prescribed for both C
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The basic excise duty on
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been increased from 15 p
20 per cent ad valorem.
have also been effected in
of excise duty on
[illegible]
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Major minerals output may fall short of target

A recent official review has shown that the output of several key minerals by the end of the 7th Plan may fall short of the target. As a result, the country's reliance on imports to meet the consequent gap between demand and availability will considerably go up.

This will also mean greater strain on the foreign exchange reserves which are already in a precarious state. The aluminium output target for 1989-90 is set at 4,99,000 tonnes, while anticipated achievement will be 450,000 tonnes according to the review.

Similarly in the case of copper refined, the target is 42,700 tonnes, but the actual output may be around 39,000 tonnes. Zinc output may not exceed 83,000 tonnes as against the target of 89,000 tonnes.

Out of 17 principal minerals, there was substantial fall in the output of seven last year for which the latest figures are available as compared to 1986. Production of five minerals was only marginally higher.

The production of gold fell from 931 kg. in 1986 to 1,864 kg. in 1987 Chromite output fell from 630,000 tonnes to 624,000 tonnes.

Similarly manganese ore production fell from 12,84,000 tonnes to 2,75,000 tonnes, barytes from 37,000 tonnes to 2,12,000 tonnes dolomite from 22,00,000 tonnes to 1,78,000 tonnes magnesite from 60,000 tonnes to 4,20,000 tonnes and bauxite from 3,79,000 tonnes to 9,000 tonnes.

Production of the following metals was only marginally higher: lead concentrate from 44,000 tonnes to 47,000 tonnes, zinc concentrate from 90,000 tonnes to 105,000 tonnes apatite and phosphorite from 7,000 tonnes to 6.79.000 tonnes.

[illegible] production in both the years was 27,000 tonnes, iron ore [illegible] marginally improved from [illegible] million tonnes to 49.4 million tonnes.

Production targets may, however, be exceeded in iron ore and lead concentrate is 58.1 million tonnes and for lead 27,000 tonnes.

INDUSTRY HAILS NEW STATE POLICY

Trade and industry circles have welcomed the Maharashtra government's new industrial policy offering a range of incentives giving a new thrust to the process of industrialisation of the state.

The Bombay Chamber of Commerce president, Mr. K. R. V. Subramaniam, said while the plan to develop 64 growth centres in the coming years was laudable, the chamber suggested that it would be advisable to develop one or two model growth centres with all social and economic infrastructure initially in Vidarbha, Marathwada and Konkan areas to serve as examples for the creation of similar centres in othr areas of the state.

The industry would be ready to cooperate in the formulation of such model growth centres, the chamber president said.

The creation of a ministry of textiles at the state level is very appropriate and timely as the restoration of the health of this industry.

The chamber hopes that to accelerate the pace of industrialisation, the incentives announced for expansion and diversification will also be available to larger industrial units including those in group A area.

The Confedration of Engineering Industry (CEI) said that it would look forward to proper implementation of the policy for accelerated growth of industries in the state.

CEI felt, however, that the policy should have provided for solving specific problems of industrial units in metropolitan areas in need of modernisation.

The All India Association of Industries said the new policy would provide the much-needed impetus to the industrial growth of Maharashtra.

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New package to boost exports

The Union Government has approved a package of measures to help the country achieve higher exports during the current financial year, the target for which has been revised upwards to Rs. 18,795 crores. This signifies a 19.6 per cent growth in dollar terms over the performance in 1987-88.

The package includes reduction in import duty on a variety of raw materials needed for the thrust export sectors, removal of freight-related problems, availability of more raw materials at international prices and relaxation of monetary restrictions on the gems and jewellery sector.

The measures are contained in a short-term strategy paper prepared by the Commerce Ministry, which was discussed and approved at the meeting of the Cabinet Committe on Exports, held under the chairmanship of the Prime Minister, Mr. Rajiv Gandhi, on August 2. The meeting was attended, among others, by the Commerce Minister, Mr. Dinesh Singh.

In order to achieve the overall export target, it has now been decided to earmark the entire prodn. of alumina and aluminium by the National Alumnium Co. for exports during '88-89. It has also been decided that the problems of competitiveness arising out of high freight and port charges in the minerals sector would be resolved so as to ensure additional exports in these sectors, which have been facing difficult export prospects in recent years, especially in iron ore because of the depressed world market.

The package includes reduction of import duty on PU foil/film and on thermoplastic rubber materials used for the manufacture of TPR soles for boosting exports of leather and leather manufactures. It has also been decided that supply of raw materials like HR coils, pig iron and billets to the engineering exporters would be ensured.

It has been decided that availability of adequate funds under the International Price Reimbursement Scheme (IPRS) would be ensured through an appropriate mechanism like alternative sources of funding. Permission to import second-hand building drums and presses will also be granted to step up exports of automotive tyres.

Another measure, approved by the committee, pertains to reduction in import duty on automatic glove-making plants and ceramic moulds to take advantage of favourable trends in the international market for rubber surgical gloves for making an export thurst.

In addition, it has been decided that public sector units such as the Indian Oil Corporation and Hindustan Organic Chemicals would be directed to supply chemical raw materials and intermediates needed by exporters of drugs and pharmaceuticals, dyes and dye intermediates, organic and inorganic chemicals, agro-chemicals and plastics at international prices against surrender of advance licences.

These measures have been evolved on the basis of surveys of prospects for raising exports in different sectors after taking into account the domestic production, particularly in the context of the drought, growth in export surpluses, nature of competition faced by the products abroad and the trends of world demand.

While the effort has been to concentrate on maximising exports in all sectors, the main areas, which are expected to show substantial growth during the current year are engineering goods, chemicals and related products, leather manufactures and gems and jewellery.

Accordingly, the targets for these sectors have been revised upwards. The revised targets are Rs. 2,000 crores for engineering goods, Rs. 1,900 crores for chemicals and related products, Rs. 1,500 crores for leather manufactures and Rs. 4,000 crores for gems and jewellery. The growth projected for these sectors works out to 39.6 per cent, 48.4 per cent, 31.7 per cent and 53.1 per cent respectively.

The export strategy underlying these measures has three broad objectives. These are: accelera
production in the export-orie
sectors and simultaneously incr
ing exportable surplus, exerci
selective restraints on domestic c
sumption and to the extent necess
providing capital goods, raw m
rials and components at world
ces for export production as a ge
ral principle, and to accord prio
to export demands in the area
infrastructure, namely power, tra
portation, port and telecommun
tions.

Such a three-pronged strategy
considered necessary if a quant
jump in exports has to be achie
to raise the share of exports in
gross national product from
existing level of 4.5 per cent to
per cent.

NEW MAHARASHTRA POLICY AIMS AT SPREADING INDUSTRIAL ACTIVITY

The Maharashtra Government
announced a new industrial lo
tion policy whereby units which
set up farthest from Bombay wo
get greater incentives than th
which are nearer the overcrowd
metropolis.

Further, the five year new pa
age has such incentives which
"better than those which are p
valant in the neighbouring State
of Gujarat, Andhra Pradesh, Madh
Pradesh and Karnataka" which
cording to Chief Minister Mr. Sh
rad Pawar, would attract enterpr
es from outside.

Mr. Pawar announced to pres
persons that this distance criteri
would enable spread of industries
the backward regions for long n
glected and if industrial enterpri
assure and demonstrate that 80 p
cent of the non-technical jobs wou
be given to locals then incentiv
would be more.

Though details are yet to be wo
ked out, the Maharashtra Gover
ment has a proposal to give grea
incentives to those industries wh
are located within Bombay, Than
Belapur region but would like
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Company News

TAC TO DIVERSIFY

Tuticorin Alkali Chemicals & Fertilisers Limited (TAC) is to diversify into low investment and high return areas, such as pesticides and detergents. According to the company's vice-chairman and president, Mr. C. V. S. Mani, this step would not only help in fuller utilisation of the company's marketing network but would also enable it to improve its profitability which has been under strain ever since commencement of operations in 1982.

As a first step ATC has recently acquired Sterling Pesticides Limited, a small-scale insecticides unit at Tiruchirapally, through outright purchase. The company now hopes to market such chemical formulations in a big way in the Tanjore, Tiruchirapally and Madurai districts of Tamil Nadu where it already has a well-developed agricultural inputs delivery network.

According to Mr. Mani, the company — which has 450 acres of land under salt pans at Tuticorin — has recently taken up the marketing of iodised salt through distributors. Though TAC has entered the field with a modest production of 5,000 tonnes of iodised salt per annum, there was good scope for the company to expand in this market where the annual demand was in excess of 52 lakh tonnes. At present the total production of iodised salt in the country was only around 14 lakh tonnes a year.

On prospects for the financial revival of the joint sector company which has accumulated losses amounting to Rs. 5 crores so far. Mr. Mani said that finan-

cleared a Rs. 6 crore rehabilitation package. Consequently, the company was now implementing schemes that would enable it to achieve additional production of 10,000 tonnes each of soda ash and ammonium chloride annually as well as give it a captive power generation capacity thus enabling it to tide over problems of power cuts.

TAC, which has been jointly promoted by the Tamil Nadu Industrial Development Corporation and Southern Petrochemicals Industries Corporation (SPIC), presently has a licenced capacity to produce 66,000 tonnes each of soda ash and ammonium chloride per annum.

The Centre's decision to place ammonium chloride under the retention price scheme had helped the company turn the corner and report its first ever profit of Rs. 4.06 crores in 1987, Mr. Mani said. The company's turnover during the 12-month period ended December 31, 1987 was Rs. 39.01 crores as against a turnover of Rs. 48.43 crores for the 18-month period ended December 31, 1986.

UNION CARBIDE

The shareholders of Union Carbide India Limited (UCIL) passed a special resolution altering the memorandum of association of the company paving the way for it to diversify at the annual general meeting held at Calcutta recently.

According to chairman-cum-managing director V.P. Gokhale, the need for diversi-

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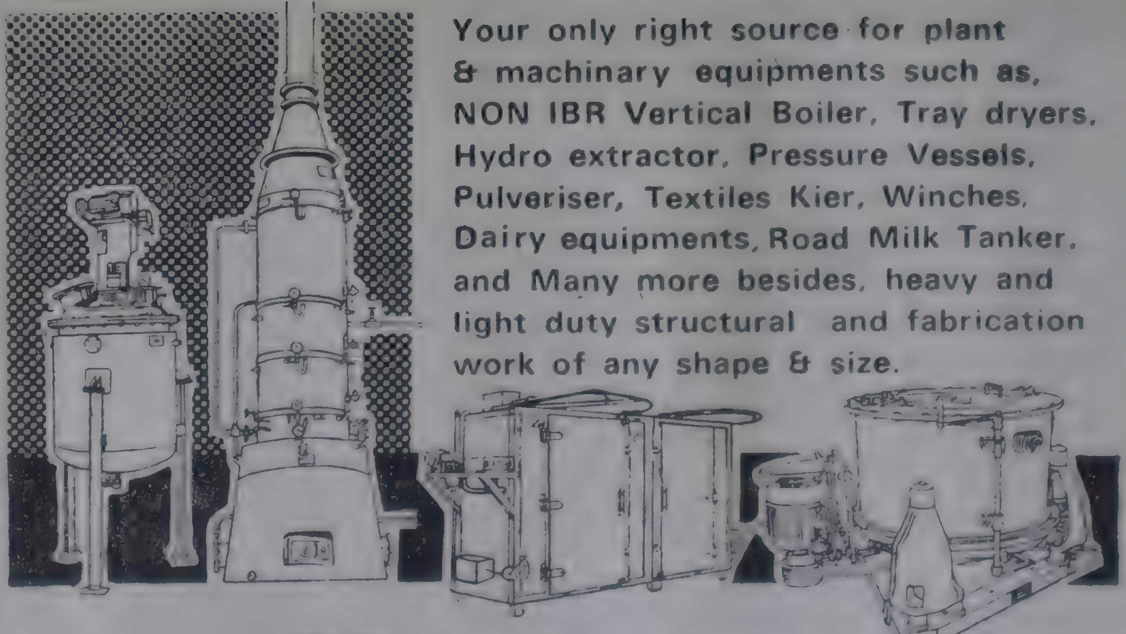

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fication had become necessary due to the saturation in the dry battery market. While demand in the home market has remained static at 1985 levels, he said the export market was declining as most countries had sufficient indigenous capacity for battery manufacture.

Referring to the company's performance during 1987, Mr. Gokhale said a major concern was the closed Chembur chemicals and plastics plant, which was incurring a loss of Rs. 50 lakhs per month.

He mentioned that since public sector organisations had not shown any interest in acquiring the plant, the company was hopeful of securing Union government approval to sell the plant to a private sector organisation.

It was contemplated that under such a transaction, the buyer will continue the services of all current employees of the Chembur unit on the existing terms and conditions of service.

Mr Gokhale said UCIL had received various offers in this regard but with a view to offering an opportunity to other organisations with necessary financial and managerial capabilities to bid for the plant, the board had decided to extend the last day for receipt of offers to August 25, 1988.

During 1987, the company's income was Rs. 200.96 crores compared to Rs. 217. 45 crores in 1986. Profit before tax was Rs. 7.25 crores (Rs. 9.01 crores in 1986) and profit after tax Rs. 4.75 crores (Rs. 5.01 crores). The company paid a divided of 12 per cent, the same as the previous year.

TWO SHORTLISTED FOR SHALIMAR PAINTS TAKEOVER

Courtaulds is understood to have shortlisted two prospective buyers for the Calcutta-based Shalimar Paints Limited, in which it has a 32 per cent stake through its subsidiary, national Paints PLC.

The two parties, accor informed sources, are ICI the Indian outfit of w IEL Limited, and indu Vijay Mallya of United B ies. In all, around six in al groups, almost all o based in this part of the try, are known to have Shalimar Paints.

Both the groups sho by Courtaulds, already presence in the paint in in India, Mr. Mallya in th of a controlling interest Calcutta-based Berger and IEL in its paints divi Rishra.

With the acquisition o limar Paints, which rep turnover of slightly les Rs. 60 crores last year, ei these two groups could b number two in the in overtaking the current n two, Goodlass Nerolac (tu approximately Rs. 104 cr

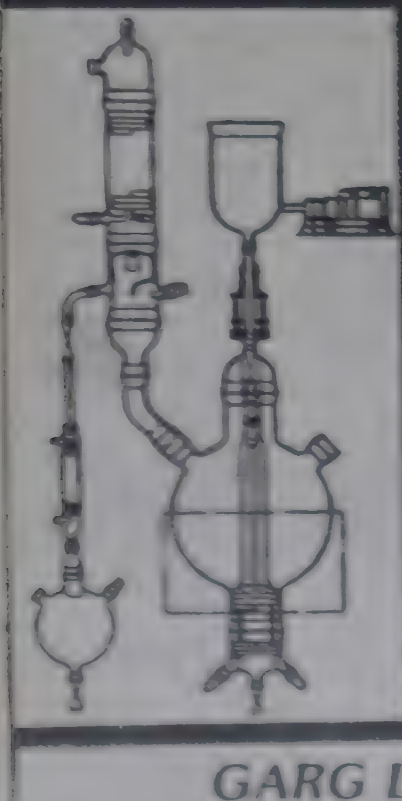
Courtaulds, it appears, to dispose off Shalimar to either of these parties foreign exchange tra would be smoother.

CHEMOX CHEMICAL

Chemox Chemical Ind has recommended a maid vidend of six per cent o enlarged capital on prorat is for the year ended 1988. The company has well.

The turnover is up by cent to Rs. 769.16 lakhs Rs. 577.91 lakhs in the pr year. The gross profit has than doubled to Rs. 7.46 [illegible] Rs. 3.06 lakhs last y

The net profit has risen [illegible] to Rs. 4.12 lakhs Rs. 1.45 lakhs after deprec (Rs. [illegible].33 lakh against Rs [illegible] taxation (Rs. three [illegible] Rs. 1.55 lakhs) and [illegible] the preliminary expenses (Rs. 0.01



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Spotlight on Biotechnology & Life Sciences (

A New Genetically Engineered Nitrogen Fixing Soil Bacteria Under Field Trial

Biotechnica International has started field tests with its genetically engineered nitrogen fixing soil bacterium Rhizobium meliloti on ninety alfalfa test plots at its Chippewa agricultural station. In greenhouse trials the gene-spliced strain increased yields of alfalfa according to Dr. David Glass, vice-president of government and regulatory affairs for Biotechnica Agriculture.

USA grows about 25.5 million acres/year of alfalfa producing a total crop worth $7 billion. Conventional strains of rhizobia are used on about 80% of this crop. Because the crop is not in a surplus situation and growers receive a premium price for good quality alfalfa, an increase in yield provided by a competitively priced seed innoculant can mean more profit for growers. This is another example of the contribution of biotechnology (via genetic engineering) for boosting agriculture's profitability.

Biotechnica hopes to win government's approval later in 1988 for gene-spliced rhizobia strains specific to nitrogen fixation in soya bean. Company scientists are also working to engineer herbicide, disease and insect resistance in maize, soya beans, wheat and alfalfa. (ECN 5.2.88 p. 17)

The World's First Ever Transfer Of A Foreign Gene Into Maize

Plant scientists at Sandoz Crop Protection Corp. in Pa [illegible] gene into maize plants. This is a new landmark in agricultural biotechnology. Transferring genes that make plants resistant to pests, herbicides and diseases is one of the key targets for agricultural biotechnology. While this has been accomplished in dicotyledonous plants such as tobacco and tomato, the transfer of genes into commercially important monocotyledons, such as cereals has not now proved elusive.

The genetic transformation of dicots is accomplished by smuggling the target gene into the plant using the bacterium Agrobacterium tumefaciens. This technique cannot be employed on cereal crops because these plants are not as susceptible to infection by the bacterium. Sandoz researchers have adopted, however, a different novel approach. They report using protoplasts, plant cells stripped of their cell walls to translate the genes. These protoplasts are subjected to an electric current which produces holes in the membrane to allow the passage of the desired genes present in the growth medium into the cell.

The Sandoz research team then grew these protoplasts with a nurse culture of Black Mexican Sweet Maize Cell suspension. As a marker, researchers used a gene that eventually provides resistance to the antibiotic kanamycin. The researchers managed to grow plants from these cells that were resistant to the antibiotic indicating successful transfer of the genes.

But as the scientists [illegible]

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ce 240, pp 204-207)

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1988 p. 17)

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Novo Publishes An Informative Handbook On Practical Biotechnology

Novo Industry (Denmark) has recently published an informative handbook under the title: "Handbook of Practical Biotechnology". This handbook besides covering interesting aspects of practical biotechnology, gives an excellent review of the role of enzymes in food processing. The Table 1 below covers major applications of enzymes in food technology.

Table 1: Enzyme Applications In Foods & Food Processing

Industry	Applications
Baking	Dough conditioning
	Flour bleaching
	Flour malting
	Anti-staling
Brewing	Low calorie beer
	Chill-proofing
	Barley brewing
	Alternative adjunct liquefaction and saccharification
Dairy	Cheese making
	Accelerated cheese ripening
	Natural cheese flavour concentrates
	Whey utilization
	Lactose intolerance reduction
Fruit Juice	Mash treatment
	Depectinization
	Starch/Araban haze removal
	Citrus pulp wash viscosity reduction
Starch	High fructose corn syrup (HFCS)
	Maltose syrups
	Dextrin syrups
	Dextrose
Protein	Flavouring
	Soy milk production
	Egg white replacers
	Emulsifier production
	Functional hydrolysates
Fats & Oils	Cocoa butter substitutes
	Flavour ester synthesis
	Speciality fats for better nutrition
Pet Foods	[illegible]
	Palatability improvement
	Improving extruder performance
[illegible]	Meat tenderizing
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Enzymes are natural versatile catalysts. The food industry has taken advantage of their capability to increase product yields and increase byproducts and reduce energy costs.

Biochemists formally classify enzymes into 6 categories according to the reaction catalyzed :-

- Oxidation/reduction
- ligation
- **Hydrolysing**
- Transfer reactions
- Isomerizations and
- Reactions in which they are additives to double bonds.

The use of enzymes in food processing has greatly expanded in recent years (refer Table 1 in p. 75) and cover the following significant objectives: (a) reduce viscosity, (b) improve extraction, (c) carry out bioconversions, (d) enhance separations, (e) develop functionality, (f) create or intensify flavour and (g) synthesize novel chemicals via fermentation.

Most of the industrial enzymes used today in the food industry fall into hydrolytic category. These enzymes characteristically depolymerize their substrates into smaller oligomers and/or monomers. Examples include; proteins that break proteins into peptides and/or amino acids, amylases that hydrolyze starch to dextrins and simple sugars like maltose or glucose and lipases that split fatty acids off triglycerides.

Enzymes have contributed greatly to the development of novel foods, fast foods, packaged food products with long shelf-life in affluent countries like America, Japan & Western Europe. In contrast, the foods in the third world countries are drab with practically little or no development of novel foods from local food resource. Food enzymes have also played an important role in developing a range of packaged foods based on soyabeans in affluent countries particularly in Japan and USA.

(Nova's Handbook of Practical
Biotechnology,
For a free copy, contact:
Novo Laboratories Inc.,
33, Turner Road, Dept. CEP,
Danbury, CT. 06810, USA.)

Unilever Unveils Dynamic Plans for Biotech Research On Seed Improvement

Unilever (UK) has recently unveiled some of its plans for the plant breeding and seedmarketing organization it bought recently from the UK government last year for $123 million. The new Plant Breeding International (Cambridge, UK) will continue with its breeding programmes for wheat, barely, potatoes, oilseeds and pulses and will eventually be expanding its crop portfolio.

The Company's research policy will focus on improving yields, quality, and disease resistance and will aim to serve the end-user sectors, such as the food industry. Unilever scientists have been asked to focus on improved fatty acid profiles in the oil seed crops. This research therefore should have particular significance for India (the world's largest importer of edible oils). Unilever is also investing in biotechnology in a big way.

Unilever's interest in the seeds sector is, however different from that of the chemical industry. The company will focus on the genetic improvement of the raw materials of the food industry. In contrast, chemical companies are interested in the sector because it will support their agrochemical business. (ECN, 5/9.88, p. 23)

The World's First Patent For A Genetically Engineered Animal

A genetically engineered mouse has shaken the foundation o biotechnology in the US by earning the world's first patent for genetically engineered anima The USA government's Patent & Trade Mark Office last April issued the patent to Harvard University and two of the university' scientists Philip Leder and Timothy Stewart. Du Pont which ha funded Leder's research sinc 1981, has an exclusive licenc to breed the mice commercially.

The patent is broad coverin any "non-human eukaryotic (having nucleated cells)" into which scientists plant an active oncogene (a cancer causing gene) or sequence of DNA that induces cancer in the animal and its offspring. Leder and Stewart created a 'transgenic' animal, a mouse that carries the oncogene c mye in both its result, the mouse cells. As a result, the mouse and its offspring are genetically predisposed to breast cancer Harvard has deposited the plasmid, or genetic vector carrying the oncogene with the American Type Culture Collection.

Such mice are valuable to researchers for testing the potency of carcinogens or substances that combat cancer and as cell bank for cancer research. Harvard's mice will succumb to carcinogens at lower doses more commonly found in nature.

Researchers at the USDA, are experimenting with several transgenic animals, e.g. they have developed a genetically engineered chicken that is resistant to avain leukosis virus. Another application to the patent office by Integrated Genetics (Massachusetts USA) covers engineered rodents that secrete a therapeutic protein, tissue plasminogen activator, in the milk of lactating females. The Company has also applied for patents in Europe. (**New Sc.**, 4/21/88, p. 23)

New Bacteria ıdentified For Soil Clean Up

Microorganisms have successfully cleaned up about 4000 cu. yd of diesel and gasoline contaminated soil in a project undertaken by Biota (Los Angeles), an environmental consulting firm that specializes in the use of microbes. Employing bacteria saved an unidentified client about 75% in costs, compared with the alternative of shipping the contaminated dirt to a landfill. The project was unusual in terms of its size and it took about 3-1/2 months to reduce contaminant levels to those that are significantly lower than the legal requirement.

The site was a non-operational Los Angeles distribution and trucking facility where soil had been contaminated by leaking underground fuel tanks. After the tanks were removed, the soil was excavated and the hydrocarbons were degraded by two naturally occurring bacteria Pseudomonas pseudomallei and Serralia liquefaciens. Potassium nitrate was added to the soil, which had virtually no nitrogen. Phosphate buffers were also added to stabilize the pH.

In another project, with Hercules, Biota is planning to use bacteria to clean up soil residues of trinitrotoluene and dinitrobenzene. The researchers have identified five different species to successfully clean-up the above soil residues. These species include three different Pseudomonas species, one species of Aeromona's and one species of Enterobacter. (**Chem. Wk.**, 5/4/88, p. 43)

European Corn Borer In Corn To Be Eradicated By Genetically-Engineered Micro-organisms

The first field trials in USA of a genetically-engineered microorganism is expected to take place in Maryland in the spring of 1988. The organism combats the European corn borer — an insect that damages corn worth $400 million in the USA alone. The French National Agricultural Research Centre is also considering proposals for trials of the same organisms.

Crop Genetics International (CGI), the company that engineered the organism hopes to market it by 1991. The well-known environmentalist Jeremy Rifkin, however, reports that the organism could constitute a hazard to the environment.

CGI re-engineered the microbe Clavibacterxyl cynodontis (Cxc) to include a gene from Bacillus thuringiensis (Bt.). The gene codes for Kurstaki, an insecticidal endotoxin that interferes with the digestive systems of caterpillars including the European corn borer.

Trialls in greenhouses show that Cxc the parent bacteria, will colonize corn. Rifkin reports that the parent bacteria threatens the environment because it will also colonize 83 other plant species.

Last April, the Hazard Evaluation Division of the US's EPA issued a permit for CGI to do small scale field trials. This, however, is not a formal approval. The EPA will wait for public comments and a review of the report by academic experts.

Before giving approval for tests, the EPA considers whether the organisms constitute a threat to people or to other organisms and whether it is likely to persist in the environment. There will be limited human exposing in these trials. The plants will be burnt after the trial and Cxc is pretty fastidious. It cannot grow at the human body temperature. Further, before the EPA reaches a final decision, geneticists will study the length of time that the gene stays in Cxc. (**New Sc., 4/7/88, p. 18**).

A New Cotton Hybridization Technology Developed

American Cyanamid Co. has purchased Piewalt Corporation's cotton hybridization technology and established Chembred Inc. in Arizona to develop it.

The technology offers both near term potential for significantly higher cotton yields and longer range potential for the introduction of genetically engineered traits into cotton and other crops.

Field evaluations have shown a minimum of 10 to 12% higher cotton yields and excellent seedling vigour in the hybrid plants reports Chemred researchers.

Conventional approaches to developing hybrid cotton have been largely unsuccessful because of the nature of the plant. The Chembred hybridizing agent (CHA) renders the male part of the cotton plant sterile, thereby allowing the plant to be pollinated by other non-CHA treated plants nearby. "Widely varying selection opportunities with the Chembred system also make plant breeding for specific market areas quite promising" reports Dr. Denis Ciarlante, associate director of new product development in Cyanamid's Agricultural Research Division. (**CMR**, 12/21/87, p. 49)

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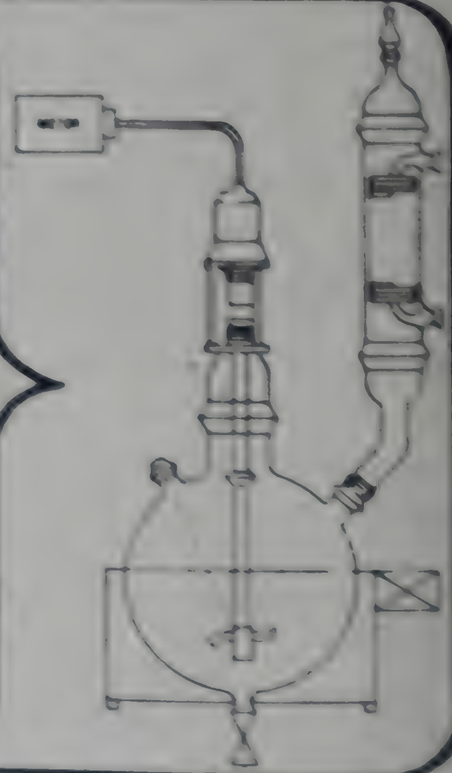

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Thermal Stabilisation of Polyvinyl Chloride: Tin Stabilisers

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RODUCTION

lyvinyl chloride (PVC) has wide industrial applica- n both rigid and flexible forms. The major applica- s of PVC are in the form of films, foams, electrical ances, wall and floor covering and host of others. ever, the basic disadvantage associated with PVC been its inherent thermal instability which leads to ormation of coloured material on heating, specially id form of PVC. Further in out-door applications, is exposed to heat, light and humidity causing adation. Some of the degraded products may act hromophores helping light absorption and subse- t photo-induced chain scission reaction. Although, scission and cross linking both take place during al exposure of this polymer, the term degradation ually referred to the dehydrochlorination reaction ng to the conjugated structures.

e to these reasons, it is imperative to use stabilizer compounding ingredient for PVC. The nature and of stabilizer vary according to the requirement. ever, incorporation of thermal stabilizer(s) is a must use without it PVC cannot be processed. Lead ounds, combination of calcium and barium com- d and tin compounds are very useful and popular. these, tin stabilizers are usually superior (if used ously) in stabilizing PVC. The advantages include:

ides being a thermo-stabilizer, they act as anti- dant too.

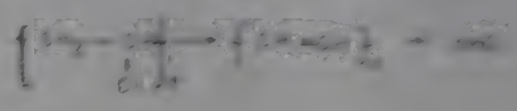
exert curative function by reacting with polyene ences as in case of tin maleates thereby contri- g to shortening of polyene chains responsible for olouration.

react with already formed onium salt providing her curative function.

provide a compatible system with other com- ents of the mixture.

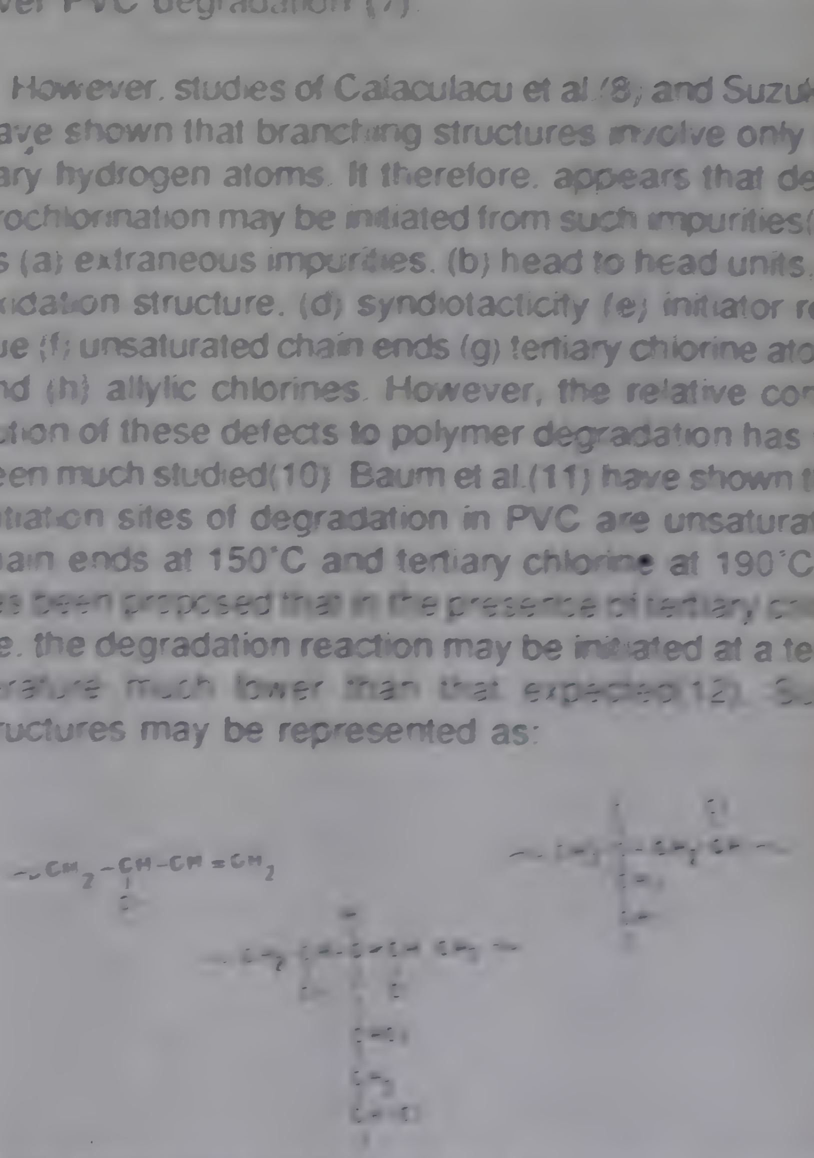
anism of Thermal Degradation

siderable amount of research has been con- d on the mechanism of PVC. It has been observed e elimination of hydrogen chloride followed by the distribution of conjugated polyene sequences along the molecular chain is the first step of degradation.



The thermo oxidative degradation of PVC is thus a complicated chemical process even in the initial stages. Since, the chemical structure of PVC is not expected to be unstable below 200 C as confirmed by the thermal stability of model compounds such as 2, 4 dichloro pentane and 2, 4 6 trichloroheptane etc (1, 2-4), it has been proposed that various structural defects or impurities are responsible for thermal instability in the polymer (5, 6). It has recently been proposed that chloroallyl groups present in PVC have a considerable influence over PVC degradation (7).

However, studies of Calaculacu et al.(8) and Suzuki(9) have shown that branching structures involve only tertiary hydrogen atoms. It therefore, appears that dehydrochlorination may be initiated from such impurities(10) as (a) extraneous impurities, (b) head to head units, (c) oxidation structure, (d) syndiotacticity (e) initiator residue (f) unsaturated chain ends (g) tertiary chlorine atoms and (h) allylic chlorines. However, the relative contribution of these defects to polymer degradation has not been much studied(10). Baum et al.(11) have shown that initiation sites of degradation in PVC are unsaturated chain ends at 150°C and tertiary chlorine at 190°C. It has been proposed that in the presence of tertiary chlorine, the degradation reaction may be initiated at a temperature much lower than that expected(12). Such structures may be represented as:



The importance of HCl of the branched structures towards thermal dehydrochlorination has been shown by [illegible]. However, it has been accepted that the [illegible] drochlorination takes place in the form of zip elimination. The average length of polyene sequences, varies in the range of 4-10 which suggests that dehydrochlorination does not proceed along the entire molecule, instead the chain gets terminated(14). The degradation, therefore, proceeds practically without any molecular chain scission(15). However, the presence of oxygen causes more severe effects on PVC degradation. A correlation between dehydrochlorination and unsaturation has been made by others also (17, 18). Thermal degradation of PVC has been shown to be an autocatalytic process due to the presence of eliminated HCl. The interaction of HCl with polyenes in the molecular chains has been reported by a number of workers (15, 19, 20). The formation of both longer as well as shorter polyene formation has been observed(21). However, the formation of polyene sequence length depends on whether the HCl formed has been removed or allowed to remain in the polymer matrix. Recently Nagy et al.(22) have shown that HCl is able to reinitiate the allyl-activated zip elimination by a mechanism involving proton-exchange with polyenes. In the presence of HCl, proton exchange may lead to the migration of the polyene resulting in the formation of allyl-activated chlorine atom which is then involved in the reinitiation of zip-elimination.

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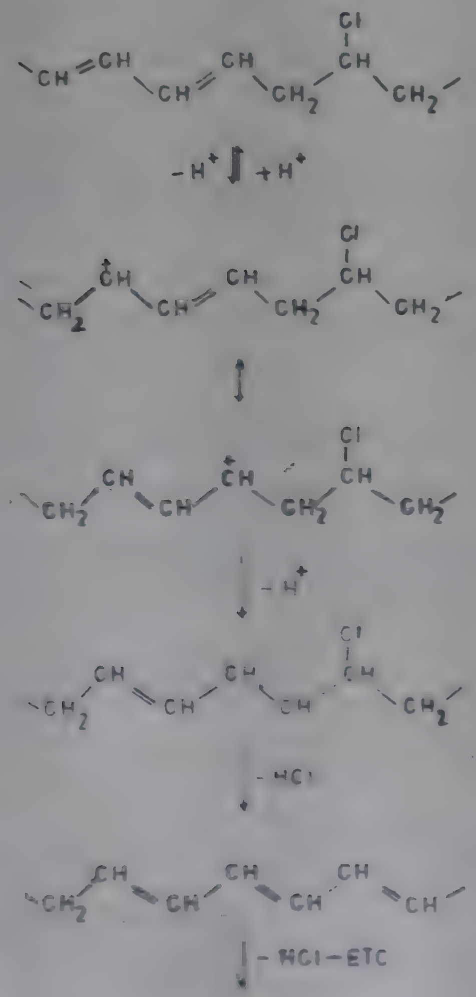
* t Address: Laboratoire de Chimie Macro[illegible] [illegible] C.N.R.S. Thiais, France.



Such a migratory process along the chain facilita the conversion of short polyene segments into lon one -- thereby linking up the sequences.

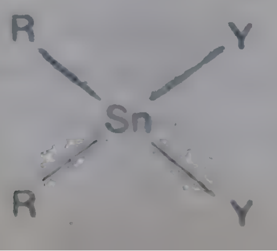
$$\text{-------}(CH{=}CH)_n\text{-----} + \text{-----} [CH = CH]_m$$
$$\downarrow$$
$$\text{-------}[-CH = CH\,]_{n+m}$$

It has been observed that a number of chemical re tions also follow during the course of thermal degrac tion (23, 24). Studies (25-30) have shown that the ra of degradation and distribution of polyene sequenc is highly dependent upon the tacticity of polymer. Sin it is the polymerization conditions (the most promin being temperature and catalyst) which determine t stereoregularity of PVC(31, 32), the careful selection these parameters may be useful in reducing the degr ative nature of the polymer. It has been found t degradation is much higher with the increase in s diotacticity in the polymer and results in the format of long polyene sequences(31). These observatic suggest that the propagation of conjugated structure facilitated along the syndiotactic sequences. Park a Skeno(32) presented a relation between the dehydro lorination rate of PVC obtained by solution polymeri tion using four initiators. They reported that t dehydrochlorination rate decreased in the follow order:

Lauryl peroxide > diisopropyl peroxydicarbonat

benzoyl peroxide > azobis isobutyronitrile

They found that the degradation rate of PVC incr sed with the increasing initiator content. An interest study on the X-ray-induced polymerization of PVC h been reported by Henderson et al. 33. It was found t the polymer prepared at less than 0.45 Mrad exposu had thermal stability comparable to that of commerc suspension grade PVC. It has been proposed that all chlorines produced during radiolysis could be respon ible for the decrease in stability. A wide variety of st ilizers is available which may provide a material w acceptable thermal stability, the most common or being organometallic compounds such as organo mercaptide, maleates, barium/cadmium carboxylat organic phosphite and epoxy compounds. However, organotin mercaptide, of the general formula



where R is CH_3, C_4H_9 etc. and Y is OOCR', OOCCH=CH COOR' or SCH_2COOR', have proved to be very effective class of stabilizers for PVC because of their excellent performance for all the methods of processing and hence, constitute a large fraction of the current research on thermal stabilization of PVC with special attention to their mode of action(34-36). Of the several organotin compounds currently in use for PVC thermal stabilization, dialkyltin bis (iso-octyl thioglycolate) has shown better results.

As discussed earlier, hydrogen chloride exerts a catalytic action to the thermal degradation of PVC and proceeds by an ionic or molecular-ionic mechanism. Therefore, using effective acceptors of HCl, it may become possible to reduce the auto-catalytic dehydrochlorination of PVC. Consequently, deactivation of ionic pairs and ions involved in chain-ionic mechanism or else the interaction of a compound with conjugated double bonds should also be effective in reducing degradation of PVC. A number of studies(37-39) have shown that the stabilisers provide maximum thermal stabilisation for PVC by (a) eliminating labile sites responsible for dehydrochlorination, (b) acting as HCl scavenger, (c) reacting with free radicals as they are formed and (d) acting as antioxidants. The efficiency of organotin mercaptides lies in the fact that they are capable of binding the hydrogen chloride and hence neutralise its accelerating effect on the dehydrochlorination. Rockett et al.(40) have shown that such a behaviour provides a preventive function to the degradation. This observation was based on his earlier studies(41) involving the cleavage of organotin compounds by aqueous hydrochloric acid.

$$(n\text{-}OC)_2Sn(\text{-}S\text{-}CH_2\text{-}COO\text{-}iO_c)_2 + 2HCl \dashrightarrow (n\text{-}O_c)_2\,Sn\,Cl_2 + 2HS\text{-}CH_2\text{-}CO\text{-}O\text{-}iO_c$$

The tin chlorides thus formed are still able to retard the thermal dehydrochlorination of PVC. This may be because of the complex formation between tin chlorides and allyl structures along the molecular chain. It does not mean that such chlorides could provide a thermal stabilizing system to the polymer, where like conventional stabilisers, an induction period is of utmost importance and hence, such chlorides may be expected to enhance the overall efficiency of the stabliser. Hoang et al.(42) have determined the retardation effect of various alkyl-tin chlorides on the dehydrochlorination in PVC, which depends upon the Lewis acidity of the compound. They found that butyltin mono and dichlorides exert good retardation effect in the system. However, trichloride act as efficient pro-degradant catalyst but the effect being much lower than that of $ZnCl_2$. A study(43) has shown that certain structural features in tin stabilizer are desirable for good stabilisation but, in general there does not exist any exact correlation between the structure and stabilising efficiency. Ayrey et al.(44) tried to correlate the effect of alkyl group of organotin bis (iso octyl thioglycolate) with their stabilising efficiency in PVC. As such no single conclusion could be drawn from his results. However, n-alkyl group was found to provide better stabilisation than branched ones (Table I). Further, alkyl derivatives were found to be superior to the aryl derivatives probably because of their higher susceptibility towards carbon-tin bond cleavage by HCl, a reaction which reduces pro-degradant tin IV chloride(45).

TABLE-I

Efficiency of Organotin bis(isooctyl thioglycollate) $R_2Sn(SCH_2COO(C_8H_{17}\text{-}I)$ for PVC@

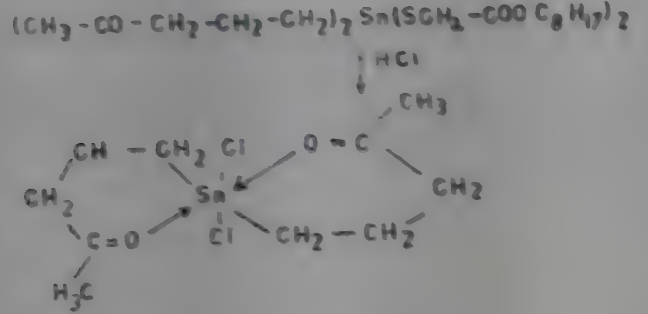
R	Time for first perceptible colour (min)	Time for sample to become black or dark brown (min)
Me	50	80
Et	60	80
Pr	40	90
Bu	40	70
t-Bu	20	30
C_8H_{17}	40	70
Me_3SiCH_2	20	50
$PhCH_2$	20	30
$BrCH_2$	0	0
$PhCH_2CH_2$	20	50
$EtOCOCH_2CH_2$	20	40
Ph	20	50
P-$MeOC_6H_4$	10	10
P-$PhOC_6H_4$	10	10
P-ClC_6H_4	10	30
P-$CF_3C_6H_4$	10	40
O-MeO C_6H_4+	20	20
O-$PhOC_6H_4$	20	40
O-F C_6H_4	20	30
No stabiliser	0*	0*

@ = 2% stabiliser introduced using hot mill. Samples then aged at 195°.

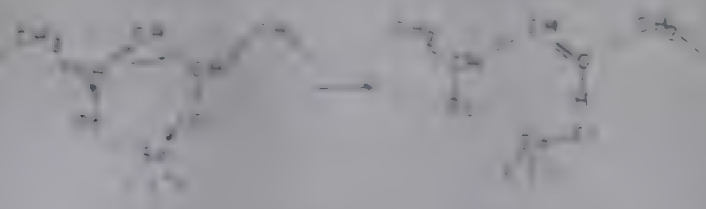
+ = Corresponding time for bis co-methoxyphenyl tin bis (methyl thioglycollate is 10,20

* = Discolouration occured during milling.

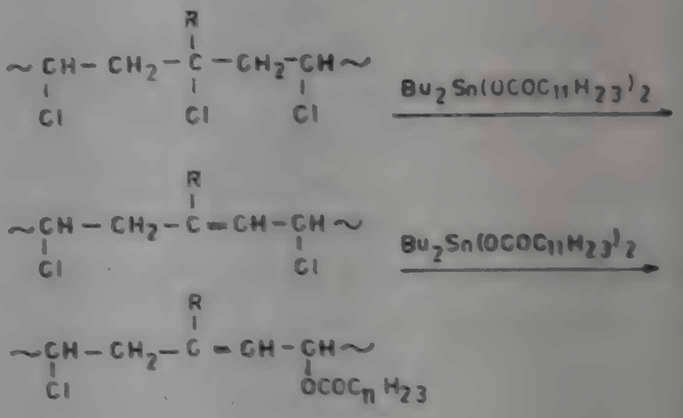
In another study, it has been found by Pollar(34) that the effectiveness of stabiliser is decreased with the increase in alkyl chain length 'R'. The substitution of a H-atom in the α-position of the alkyl group by electron withdrawing group reduces the stabilising action as observed in the case when R is $BrCH_2$. Authors(34) propose that for effective stabilisation, all of the tin compounds should be converted to the relatively weak Lewis acid R_2SnCl_2 and not in $SnCl_4$ which is a powerful catalyst for dehydrochlorination. He prepared a stabiliser, $R_2Sn(SCH_2\ COOC_8H_{17}\text{-}i)_2$, where R group was 4-keto-pentyl and found that the keto group was free in stabiliser but coordinated to tin in the dichloride. When the stabiliser was incorporated in PVC, it showed twice the effectiveness in stabilisation than dibutyl tin (isooctyl thioglycolate).



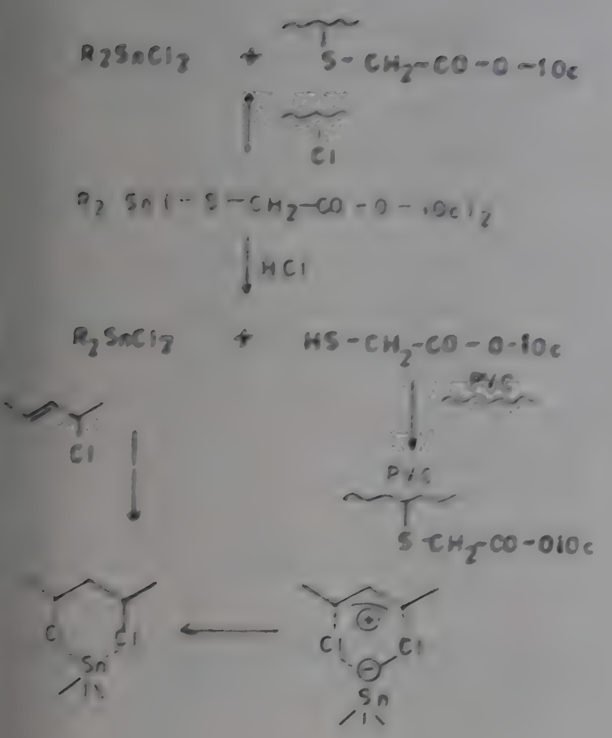
It has been found that Iso-octyl thioglycolate (IO TG), produced during the reaction, is further involved in the removal of polyene sequence by reacting with them. Considerable improvement in the colour of thermally degraded PVC samples by a treatment with IO TG has been observed(45). The possibility of a mechanism of incorporation of sulfur into PVC has been explored by several other workers also(46, 47). Initial studies of Fyre et al.(48, 49) have shown that the substitution of allylic chlorides present in the molecular chain by R_2SnY_2 during processing at elevated temperatures, is one of the main reactions involved in the thermal stabilisation of PVC. The efficiency is further enhanced by the fact that they act as a good exchanger of labile chlorine atom from the site for dehydrochlorination in the chain (50, 51). It has been proposed that the substitution reaction takes place according to the mechanism shown below. The study(50) showed that Y group of the stabiliser, R_2SnY_2, became chemically bound to the polymer chain during milling at 160°C. A mechanism for stabilisation was proposed which involved formation of a complex between tertiary or allylic chlorine atoms with the tin compound followed by the replacement of chlorine by a Y group with the liberation of R_2SnYCl.



The substitution reaction appears to be the classical property of organotin mercaptide species. Ayrey et al.(39) have also proposed that the substitution inclu a multi-centre mechanism following allylic rearrar ment. Studies(52) based on model compounds support above observation that the substitution reac of tin thioglycollate compound on the allylic chlorine ceeds through a cationic mechanism involving an in mediate carbocation as suggested by Poller et al. and Klemchuck(36). Studies of Suzuki et al.(54) m further confirmation of exchange reaction at 20 between model allylic chloro compounds and orga tin dicarboxylates, i.e., dibutyltin laurate which ac erates the elimination of chloride from a tertiary site. elimination of HCl leads to the formation of allylic c ride which is subsequently removed by ester exchar



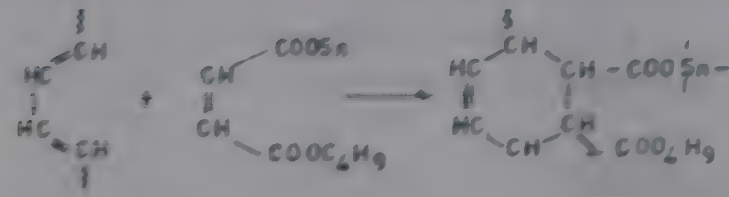
The overall stabilising efficiency of organotin merc tides, could, therefore, be summerised as showi scheme 1. An early discolouration of polymer has tc avoided in the polymer processing and this has b successfully achieved in PVC when heated at 35 using the stabilisers from dialkyl, dicycloalkyl or al cycloalkyl tin mercapto carboxylic acid ester, i.e. utyl tin bis (isooctyl thioglycollate) and an α- ß-mercapto acid or alcohol(55). It was found that s acids and alcohols as thiolactic acid, thiomalic acid, osalicylic acid, mercaptoethanol and ß-mercar propionic acid, imparted stabilising action only in c junction with the organotin mercapto acid ester wl reduced or entirely prevented development of yel colouration in the resin for first 30 minutes of hea at 350°F. These compounds even reduced any in cloudiness and discolouration in the resin introducec the tin stabiliser and other impact modifier or lubrica Rockett et al.(47) determined the stabilising effici of several organotin compounds of the struc R_2SnY_2 by milling them in PVC followed by measu colour formation. It was found that organotin merc tide and the carbothiolic ester were completely rapidly cleaved by HCl and exerted very good st zation to PVC. However, the carbothiolic esters w degraded partially to corresponding organotin carbo



cheme 1. Stabilising mechanism of Tin mercaptides

ide and were less effective. The organotin carbox- s were very poor stabilisers and did not produce nols and aqueous hydrochloric acid. These results est that the reaction of HCl, i.e., trapping of HCl e stabiliser is a prominent factor and a measure bilising efficiency.

ong the other tin compounds, maleates have been or the thermal stabilisation of PVC. But, their effi- y to the system is poor in comparison to thiogly- es. It may be because of the dienophilic nature of c acid. However, such stabilisers are very good for photo-stabilising action even better than thioglyc- s where the sensitising nature of mercapto group tes in the system. Coorey and Scott(56) have a comparative study of stabilisation mechanism yltin maleate (DBTM) and dioctyltin bis(isooctyl collate) (DOTG) during thermal processing. Thi- ollate is relatively more effective than DBTM as al stabiliser during processing. Both these stabi- have ability to introduce induction period by react- h the allylic chlorine and hydrogen chloride formed degradation. However, in contrast to maleate sta- , DBTG, has additional capability of reacting with saturated structures formed as a consequence of ano-chemically induced dehydrochlorination, y resulting in a decrease in the initial unsatura- P /C(56). Tin maleates do not have such ability, hey react with conjugated double bonds formed subsequently by a Diels-Alden reaction and hence in such cases, the unsaturation remains constant(57).



On the other hand, tin thioglycollates also reduces the hydrogen peroxide concentration to a level which is no longer measurable, providing additional thermo-oxidative stabilisation. Scott et al.(58) have given a good study on the stabilisation of PVC using tin maleate stabiliser. It was found that the efficiency of the system depends on the amount of stabiliser remaining after the processing of the polymer. Another study of stabilising effectiveness of alkyl (aryl) tin maleate and thioglycollates during the thermal degradation of PVC has been made by Troitskii et al.(59). It was found that the rate of PVC dehydrochlorination was one eighth than the rate of polymer degradation in vacuo with the removal of HCl. The stabilising efficiency of the maleate and thioglycollate has been ascribed to the trapping of HCl, interaction with conjugated double bonds of degraded PVC and reaction with the labile chlorine atoms at ß-position to the double bonds (chloroallylic groups). Interestingly, Lagner et al.(60) found that the radiation grafting of styrene or acrylonitrile to PVC is sharply reduced by the addition of such tin stabilisers as dibutyl tin laurate, dibutyltin methylene bis (thioglycollate), and dibutyltin octamethylene bis (thioglycollate). This could be because of the retardation in the decay of free radicals in PVC by these compounds which are presumed to inhibit free radical reaction.

CONCLUSION

Polyvinly chloride has become a material of wide industrial importance, in particular for construction application, flooring and wall covering. One of the drawbacks associated with the polymer has been its degradation leading to discolouration during processing at elevated temperature. This is because of certain inherent impurities in the polymer which may arise during the polymerization itself(61). Several additives have been used to impart thermal stability in the polymer but, no satisfactory combination could be established. However, current research indicates that tin stabilisers show much better results when milling is carried out with PVC. The stabilisers, such as, isooctyltin bis (thioglycollate), impart resistance to initial discolouration which is the first requisite for PVC stabilisation.

The efficiency of tin stabilisers lies in the fact that they not only act as binders of hydrochloric acid which acts as an accelerator for PVC degradation but also eliminates labile sites responsible for dehydrochlorination. Thus it is now possible to stabilize PVC more effectively against thermal degradation by the use of tin stabilisers.

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Chemical News From Abroad

XXON STUDIES LLDPE UNIT, ENIES CRACKER PLANS

Exxon Chemical is studying ne possibility of building a linar low density/high density polythylene plant in Europe. The acility would be the first of its ind for the company in the re- ion. It is a major world suppli- r of lldPE from its plants in the JS and its Kemya joint venture vith Sabic in Saudi Arabia.

Now, however, a belief that ne linear polyethylene market vill require new capacity in the 990s may lead to a decision to nvest in Western Europe, probab- y at Notre Dame de Gravenchon n France.

Exxon has been one of the nain voices in recent years against the need for new ethylene nd polyethylene capacity on the rounds that "capacity creep" at xisting plants would see the in- ustry through until the late 990s.

But Robert Wilson, Exxon Che- ical International vice presid- nt says linear polyethylene con- umption will grow faster than ne rest of the polyethylene mar- et and might require a new lant. This is among other pos- ibilities being studied for Ex- on's polymers business. A 50,000 ton/year Unipol process lant is being looked at.

Wilson denied reports that Ex- on Chemical wanted a plant in Vestern Europe in case its Saudi rabian partners decided to na- onalize the Kemya joint venture t Al Jubail. "Output from Kem- a is in our strategic planning or the future" Wilson said, ad- ing that studies were underway oncerning a capacity hike at the lant.

Other Saudi joint venture partners report no knowledge of clauses allowing the Arab partners to buy out their foreign partners, observing that this would provide very poor publicity for future investors.

Wilson also denied rumours that Exxon Chemical is planning a new cracker at Antwerp to feed a polyethylene expansion in Europe. "We think we can get our ethylene from existing facilities", he said, noting that the company was adding new furnaces at the Fife ethylene cracker in Scotland and at Notre Dame de Gravenchon and is still examining other such possibilities. It is, however, planning to start shipping ethylene to the US, which will take ethylene out of its European system.

It may be noted that a new cracker for the late 1990s would not be inconsistent with Exxon Chemical's capacity creep theory as outlined earlier this year. Then it was forecast that ethylene operating rates would drop to 86-87 per cent in the early 1990s and would not recover to above 90 per cent until late in the century.

Many companies are already believed to be planning forward for this period. In addition to supply and demand reasons, one of the driving factors behind decisions on the next major ethylene investment in Western Europe could be feedstock availability. For this reason it has been believed that it would be the major oil companies that would be the main players in the petrochemical sector at the turn of the century.

"All product areas are coming up short. I would be surprised if a lot of people are not re-evaluating where they are going," Clive Thompson, a chief executive of BP Chemicals said.

Among long term factors to be considered is availability of types of feedstock other than naphtha.

According to Thompson: LPGs will be ripe for feedstock use in the 1990s. Whereas four or five years ago you could expect the LPG window in summer to last two to four months. In 1988 the LPG window could be ten months — the surplus is with us already."

Another factor which he believes will drive investment decisions is technology. There may be no revolution in ethylene technology but older crackers are less and less efficient: "By 1996 we will have a 30 year old petrochemical industry," Thompson observes. His company is itself close to a decision with its partner Bayer on reactivating the 360,000 ton/year number 4 cracker at Erdolchemie in West Germany but information is thin on the company's longer term plans.

Statoil's proposals for a cracker at Zeebrugge, Belgium, revealed last year, were based on availability of North Sea gas and have only been hampered by internal financial problems at the Norwegian company.

Meanwhile Petrofina and Neste's plans are well established for Europe's only current grassroots cracker, the new Finaneste unit at Antwerp. Some people still believe the next unit after that will be an "industry cracker" shared between the main players, although reports are firming up on a new unit in southern Europe.

In general European players appear relatively cautious on new building plans for the longer term at this moment in time.

In North America, on the other hand, five new crackers are reported, one in Canada and four in the US by Quantum, Phillips, Dow and Formosa Plastics — although not all plans are firm. Here, though, the view has been expressed by at least one Wall Street observer that cutbacks implemented by the contractors in the recent lean years have left them short of engineering capability to build all planned units. There may be delays in getting equipment such as compressors, for example.

ICI PAINTS MOVES INTO SPAIN

ICI has finally secured a slice of the Spanish paints market with the acquisition of Du Pont's powder coatings business. This is a core business for ICI's paints operations and the deal will give the world's biggest coatings maker a 20 per cent share — worth around $6.9m — of the Spanish powder coatings market. Terms of the deal are not disclosed.

Du Pont manufactures powder coatings at its Benicarlo site south of Barcelona and will continue to supply ICI for a transitional period.

ICI became the world's top paint producer when it acquired US-based Glidden from Hanson Trust in 1986. The group has operations worldwide but has targeted both the Spanish and Italian markets in order to strengthen its European portfolio. ICI is also thought to be interested in acquiring Spanish automotive coatings producer, Barnices Valentine.

Currently the world powder coating market is worth $850m. In Europe the leading players include DSM, International Paint, Ferro, Becker and ICI.

COOKSON BID REBUFF

Cookson group has made a £27.3m ($44m) bid for Wolstenholme Rink, a Lancashire-based lithographic printing products and metal powders concern. The move comes just a week after Cookson acquired a 6.3 per cent stake in Johnson Matthey for £ 32.2m.

Although Cookson is not known for making hostile bids, Wolstenholme Rink is reported as describing the offer as most unwelcome. Cookson decided to proceed with the offer after management discussions between the two companies failed to produce recommendations to sell from Wolstenholme.

The two companies have several common businesses and from a strategic point of view Wolstenholme's operations would provide a good fit with Cookson. Cookson is thought to be particularly attracted to Wolstenholme's offset lithographic printing products.

EVC BUYS TPV

European Vinyls Corp (EVC), the PVC joint venture equally owned by Enichem and ICI, has made its first acquisition. It has acquired a minority shareholding in TPV, an Italian PVC compound manufacturer with a 10 per cent share of the market.

Eni's executive council has approved the deal which is thought to signal its go ahead for Enichem, through EVC, to move further into downstream PVC perhaps involving further acquisitions.

ICI is due to turn over to EVC its existing downstream PVC operation next year.

CDF CHIMIE FERTILIZERS POISED FOR PROFITS

After years of losses, Chimie's fertilizers bu could be set to haul itself the red providing the trend in the first half of 1988 co for the next six months. year, the division should t a profit.

According to CdF Ch general manager Jean-Pierr bron, the company has "pursuing a strategy over last two years that should bringing in money."

In a recent interview, H said that the initial restruc moves implemented before merger of Societe Chimiqu la Grande Paroisse and Chimie AZF (of which he i sident) some eight months will be complete by the yea The modernization progr designed to improve pro vity and cut costs will con

The French firm has conc ted production at fewer while closing down smaller and plants not close enoug centres of consumption, Ha explains.

When all the closures are plete, the workforce will sta around 3,500.

Grande Paroisse and AZF re production sites at Grand villy near Rouen and Nangis of Paris. Production is conc ted at these larger sites. S Grand Quevilly, some FF (\$49m) has been spent to i se nitric acid and nitrates c ty by 1,500 ton/day, du stream next January. Vario vestments totalling FF100m been made at both this sit at Toulouse, Mazingarbe, W and Montoir.

spite their links, Grande Pa- and AZF are managed as separate entities with their production and marketing orks. This, explained their dent, is in order to maintain competitiveness.

ande Paroisse's main rivals trate fertilizers are majors as Norsk Hydro and BASF, AZF operates in competi- with small local producers g complex fertilizers. This y AZF's 800,000 ton/year ity for complex fertilizers kept out of the merger.

e GP-AZF venture focuses y on nitrate fertilizers. Ca- y for phosphate fertilizers een cut from 2.5m ton to ton. Halbron claims that anks second in Europe after Hydro for production of ni- fertilizers and fourth in lex fertilizers. France is e's second largest consum- iquid nitrate solutions but as virtually ceased produc- ecause of intense US com- n where producers have elped by the weak dollar, s prices and low freight

ough Halbron concedes e fertilizer business combi- e problems of a cyclical dity business with the un- ies of the agriculture sec- believes CdF has success- sitioned itself as one of European companies that ay in the fertilizer sector. e ahead of our competi- our restructuring pro- he claims.

ether, AZF and GP produ- m ton/year of simple nitra- lizers and 2m ton/year complex fertilizers. "We are operating in Europe's largest market for fertilizers. In this business, it is important to be near the consumer. Since the AZF-GP merger we have saved FF50m this year in transport costs."

Halbron maintains that despite the EEC freeze on the development of more arable land, fertilizer consumption will grow by around 2 per cent/year. But he warns of the threat of cheap imports from the US.

To survive in the fertilizer business, a company must be flexible, avoid stock building and focus on productivity, Halbron concluded.

Turning to Norsolor, the division which now encompasses all CdF's Chemical's operations, the executive said the aim was to increase productivity. While 500 jobs are to go from the French state-owned firm, the general manager stressed no sites will be shut down.

At Dunkirk, debottlenecking work will increase polyethylene capacity by "a few tens of thousands of tons". A decision still has to be made on whether to debottleneck the ethylene cracker or double capacity, but a partner will be needed if the latter option is selected. And although the petrochemicals market is strong, Halbron said that Norsolor's strategy is to develop downstream rather than upstream.

On the acquisitions front Halbron said the firm is on the look out for an opportunity to bolster its international base.

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It had secured government agreement on the purchase of the Borg-Warner ABS business and had prepared financing for the deal, but plans were thwarted by GEP of the US, which purchased the firm last month. Had it been successful in the bid for Borg-Warner, the French firm would have had to sell off parts of the business to meet its loan repayments.

Now Norsolor is once again seeking the right opportunity but, Halbron pointed out, these are few and far between.

It is hampered by a relatively thin international production base and "our intention is to make acquisitions in Europe and the US," he says. The FF500m capital increase recently announced by Norsolor was to help fund such a purchase.

EXXON CLEARED IN PE CARTEL CASE

Proceedings have been dropped against Exxon Chemical in the current polyethylene cartel investigations in Europe. The company, along with a number of others, was the subject of proceedings by the EEC commission concerning possible antitrust violations.

It vigorously denied the allegations that it had been involved in any way with an ldPE cartel which the commission alleges operated in Europe during the early eighties.

Exxon Chemical says that after examining documentary evidence filed in response to the commission's statement of objections,
the director general of con
tion has accepted the comp
position and has advised
"There is no reason for co
ing the procedure as far as E
Chemical is concerned."

The US firm says it regar
commission's conclusions a
important endorsement of Ex
policy of strict compliance
applicable laws, wherever it
business.

Robert Wilson, vice pres
of Exxon Chemical Interna
said: "We try to uphold the
est standards of ethical beha
in our business and I'm pl
that the commission's fin
confirm that."

Wilson was due to app
person before the comm
last week but the company
given the all clear without
being necessary.

It is speculated that in
pating itself, Exxon Che
may have "dropped the
firms further in the fertilize

URALITA ACQUIRES ARAGONESAS STAKE

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ch, around Pta10bn ($73m

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Aragonesas has been the sub- ct of heavy stock market acti- y in recent weeks and state-wned oil and petrochemicals roup Repsol disclosed it has cquired a 5 per cent stake at an stimated cost of Pta 1.8bn.

It is believed by local sources hat one of the shareholders may make a public bid for Aragonesas efore the end of the year.

A booming caustic soda mar- et is currently giving Aragonesas record sales. For the 12 months o May, turnover was up 20 per cent on the previous year at Pta 3 9bn.

SCHERING PLANS U.S. FATTY ALCOHOLS HIKE

West Berlin-based Schering has announced plans to invest $50m in a major expansion of its fatty alcohols business in the U.S. Schering's industrial chemicals arm, Sherex, located in Dublin, Ohio, will expand capacity from a current 7,000 ton/year to as much as 67,000 ton/year.

The project will involve the construction of a new 40,000-60,000 ton/year plant and is expected to come on stream during the first quarter of 1991. Feedstocks for the facility will include renewable natural oils and fats, such as beef suet, coconut oil and palm oil.

The Shering group's fat chemicals operations are currently based at Mapelton, Illinois where the production slate includes fatty acids, fatty amines and derivatives, along with glycerines. Basic engineering studies for the project are being carried out by West German engineering contractor, Lurgi.

In addition to Mapelton the group is also considering two other possible sites where Sherex already has production units. These are at Janesvile, Wisconsin and at Lakeland, Florida.

Schering indicates that it will use a new technology in the plant which will be able to exploit natural oils and fats better than petrochemical technologies currently in use. No details about this subject were released, however, "for reasons of competition."

Schering is the second German oleochemicals producer to announce a major capacity expansion for fatty alcohols in the U.S. where the market is led by consumer giants, Procter & Gamble and Colgate-Palmolive, both of which use petrochemical feedstocks.

Henkel recently said that it plans to build a 30,000 ton/year fatty alcohols plant in either Texas or the Midwest, using a new process involving one-step hydrogenation of triglycerides. The Dusseldorf group has licensed the technology to West German engineering contractor, Uhde.

Henkel has said that it is aiming to corner 10 per cent of the U.S. fatty alcohols market but Schering declined to be specific on its market share intentions. However, it is understood that it will be hoping for a somewhat larger slice of the cake than Henkel.

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SOLVAY QUITS BRAZIL PLASTICS SCENE

Belgium's Solvay has completed its withdrawal from the Brazilian plastics business with the sale of its two subsidiaries to local producers. PVC producer Plavigor has been sold to Companhia Prada for an undisclosed sum, following the sale of Electroflex Industrias Plasticas to Tupy Tecnoplastica in April.

Negotiations were undertaken by Plasticos Plavinil, which already has a major stake in Plavigor. A spokesman at Solvay said this represented the last move in quitting its Brazilian plastics operations to concentrate on chemicals. Solvay's largest Brazilian interest is in Industrias Quimicas Electro Cloro, a chloralkali producer.

DSM PART-FLOTATION DELAYED

The September date mooted for DSM's partial privatization is unlikely to be met as the Dutch parliament failed to debate a bill on the flotation before adjourning for the summer recess. Parliament does not reconvene until late August.

The share issue, which involves 30 per cent of the Dutch chemicals group, will go ahead after the bill has been approved by both houses of parliament. It is not known how long this will take. The government has received advice on the proposed flotation from a council of state advisory board.

Meanwhile, DSM is continuing its preparations for entry onto the stock exchange. Based on its profits ratio and taking into account the value of comparable companies, the whole of DSM is estimated to be worth between Df1.2-3bn ($1-1.5bn). In 1987, DSM had profits of Df1.442m and sales of Df1.9.22bn.

JOBS CUT AT PHOSPHATE UNIT

Benckiser-Knapsack, a 50:50 joint venture of West German firms Benckiser and Hoechst, has announced plans to reduce the workforce at its Ladenburg plant from around 300 to 450.

The company, which had sales of almost DM300m ($163m) in 1987 and net profit of DM3.5m, said the move is a knock-on effect of the dramatic decline in phosphate sales to the detergent and cleanser industries.

Since 1985, Benckiser-Knapsack has seen sales fall by DM-80m as a result of a trend to switch to phosphate-free detergents, despite rationalization moves and a shift towards production of phosphate specialities for technical applications and the food sector.

R-P RAISES $900M FOR ACQUISITIONS

Rhone-Poulenc has received government authorization to raise the capital it needs to finance its acquisitions programme, outlined recently by president Jean-Rene Fourtou.

Many projects are currently "in a delicate phase of negotiations," a company source said.

The state-owned group has raised over $900m in new capital through the issue of perpetual notes with a number of international banks.

The move makes Rhone-Poulenc France's first nationalized business to have been given the means to raise its capital under the new socialist government

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Chemical Markets Abroad

U.S. MTBE DEMAND CREATES EUROPEAN SHORTAGES

European MTBE consumers are facing a product shortfall at a time when it is acknowledged that the MTBE market is predominantly demand led.

This situation has arisen at a time when producers were expecting to increase output and so provide a competitive alternative to traditional octane boosters.

It has been projected that European demand will be up nearly 50 per cent this year on 1987 figures of 1.1m ton. The elimination of lead as an octane booster is being prioritized by European countries, this is behind MTBE's promising growth rates. An export-oriented 500,000 ton/year plant at Sabic's Ibn Zahn complex, which is expected on stream this month, and the 420,000 ton/year Fos-Sur-Mer, Arco plant due on stream at the end of he year should improve supplies to the European market.

The US market is having a greater influence on the present European MTBE shortage than expected. Soaring demand for octane boosters, on the back of trong demand for the higher grades of gasoline, has seen world spot MTBE prices soar to 290/ton fob. A large amount of razilian product which would ave found its way into Europe as been diverted to the US.

Contract MTBE prices in the S are being talked at a ratio of .6 times premium gasoline hich is currently at $180/ton: uropean contract prices are beg dragged up to a ratio of 1.45 n response although buyers are luctant to pay this price.

If the European market contiues to tighten and price rises follow, then sources believe refinery customers will increasingly turn to alternative octane boosters. Toluene spot prices have moved up to $260/ton fob, largely because of higher US demand for octane giving an indication of the threat to MTBE from alternatives. Although there is little evidence of European gasoline pool customers switching to toluene, the threat is ever present.

In the long term, MTBE industry sources feel that as the European market expands, then the spot market should also increase. Enlarging the spot market should close the wide price gap between contract and spot levels, thus stabilizing the market. Analysts feel a less volatile spot market will convince refinery consumers that MTBE is a reliable product, compared with octane alternatives.

The massive changes that are expected in the European MTBE market in the next few years will mean a new set of rules will have to be developed. With over 1m ton of product coming on stream during the next year, largely aimed at Europe the market will be unrecognizable from its present state.

INTEROX RAISES H_2O_2 OUTPUTS

Interox, the Solvay-Laporte joint venture has increased its hydrogen peroxide capacity to nearly 400,000 ton/year with the start up of plants of associate companies in Brazil and Finland.

Peroxidos do Brazil has completed construction of an 11,000 ton/year peroxide unit at Curitiba while Finnish Peroxides has commissioned a second 15,000 ton/year line at Voikkaa. Capacity will be further increased next year when Interox America completes a second 20,000 ton/year peroxide plant at Longview in Washington. Finally, Peroxythai is currently constructing a 10,000 ton/year peroxide line at Mab Ta Phut, south of Bangkok, due on stream in mid 1990.

CHINESE INCREASE PRODUCTION

China's chemical output jumped by 12 per cent during the first half of 1988 to reach Yen-33bn ($9bn), according to figures from the country's chemical industry ministry. Despite the problems of raw material and electrical power shortages in China, 14 out of the 16 major chemical products exceeded 50 per cent of the state's annual plan.

Lowest growth was seen in the fertilizer sector-output of 7m ton was 7.6 per cent ahead of the year earlier period but caustic soda, soda ash, methanol and acetic acid all notched up gains of between 10 and 42 per cent.

The ministry warned, however, that higher prices for raw materials had increased the cost of many products and reduced profits for chemical manufacturers leading some enterprises to increase production at the expense of safety, and environment protection.

CRACKER RESTART

Carmel Olefin's 130,000 ton/year ethylene cracker at Haifa in Israel has now restarted after being closed for several weeks due to technical difficulties.

The outage of ethylene interrupted supply to the company's 100,000 ton/year PE plant and a 75,000 ton/year PVC plant operated by Frutarom. Both have now resumed production.

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News from Japan

MITI to Establish Many More Standards For Novel Materials

MITI is scheduled to energetically establish next fiscal year standards for novel materials in line with the "Sunrise Project" aimed at building up the foundation of novel-material operations.

To this end, it plans to form a liaison conference for novel materials, which will comprise related producers and users. This move is intended to combine and systematize work needed for establishing the said standards: such work is now being independently carried on by, for example, Japan High Polymer Center and Japan Fine Ceramics Association.

The planned conference is supposed to decide on terminology, unify test/assessment methods, establish novel-material standards and set up a relevant data base.

MITI also plans to form a novel-material standards office within the standards division belonging to its Agency of Industrial Science and Technology. At present the material-standards and fiber-standards sections, both attached to the division, are pushing forward standardization for metal-based and high-polymer/fine ceramics-based novel materials, respectively, but they are unable to completely deal with composite materials — which cannot be placed in conventional categories — and their work lacks efficiency.

In addition, the office will help private industrial groups beef up test/assessment methods for novel materials.

The MITI agency is actively

and four items of the Japanese Industrial Standard (JIS) have been established for high-polymers and fine ceramics, respectively. It is believed that several ten more standards need to be newly established along with commercialisation of novel materials.

L-LDPE Makers Building And Expanding Plants

Mitsubishi Petrochemical Co. Ltd. is to expand the capacity of its 80,000 — t/y L-LDPE (linear low-density polyethylene) plant to 100,000 t/y.

Having adopted Union Carbide Corporation (UCC; U.S.)'s unipol process, the company has been expanding sales and increasing production of L-LDPE.

Although suyply of LDPE is insufficient throughout the world, L-LDPE is in even shorter supply than LDPE.

Mitsubishi Petrochemical, as the largest LDPE manufacturer in Japan, has been examining expansion of L-LDPE production. A supply of raw-material ethylene has now been secured, so the company has decided to increase L-LDPE production.

L-LDPE demand increased sharply because the product can be formed into thin films and extremely strong.

Consequently, Japanse LDPE manufacturers have been proceeding with construction/expansion plans for L-LDPE plant.

Nippon Unicar has increased L-LDPE production. HDPE manufacturers are concurrently

creasing L-LDPE production by removing the bottlenecks their plants have had.

In particular, shortage of raw material ethylene is preventing L-LDPE manufacturers from increasing L-LDPE production.

Thus, only those L-LDPE manufacturers who are able to secure an ethylene supply can increase L-LDPE production.

3 Phenol Manufacturers Expanding Plants

Mitsui Petrochemical Industries, Ltd., Mitsui Toatsu Chemicals, Inc., and Japan Phenol Co. have successively mapped out plant enlargement plans on a scrap-and-build basis to solve the bottlenecks their plants have.

Mitsui Petrochemical Industries, Ltd., is planning to increase the production capacity of its phenol plant by 30% (slightly less than 40,000 t./yr.) by the end of 1990 and as the first step, is considering raising it by 10% within 1989.

Mitsui Toatsu Chemicals will expand the capacity of its phenol plant by 20,-30,000 t./yr. with completion scheduled for next spring and Japan Phenol will raise its phenol plant's production capacity by 30,000 t./yr. within this year.

The three companies say that, since the expansion of their phenol plants will be on a scrap-and-build basis for solving the bottlenecks of their plants, the plant-and equipment investment required is small, and problems such as declining demand and increase in imported products in future will be solved by lowering the opera-

New Developments from Japan

Unique Multilayered Coating Of Different Materials Possible

Nippon Steel Corpn., the world's largest steelmaker, has developed a method enabling continuous multilayered coating of ceramics and metals on a substrate in a high-level vacuum condition $(10^{-10\sim -1}$ Hg). This is said to be a world first.

This has come about from the combination of three different coating methods — plasma CVD (chemical vapor deposition), ion-plating and sputtering. With the new method, it is possible to easily select a particular coating material from many different materials to satisfy a specific requirement and it is also possible to produce a composite coating, the company explains.

It hopes the new process will be applied to outer coating of construction materials, side protectors of cars and electrical appliances etc., using stainless steel as a base. It is operating an 8-t/m pilot plant at its Hikari factory and plans to expand capacity to a commercial scale if demand rises sufficiently.

Insulating Film For Multiwiring Of VLSIs Jointly Developed

NEC Corp. and Chisso Corp. have jointly developed a polyimide film suitable for multilayer printing, which is indispensable to the development of very large scale integrations (VLSIs) of the next generation.

The film is produced through chemical bonding of polyimide resin and siloxane. It has good compatibility with inorganic insulating films including silicon-nitride film. And it also has a [illegible] rate of thermal expansion

The two firms envisage applying the new product to bipolar ICs as a first step. They claim that potential applications of the product are 16-megabit DRAMs and logic LSIs having several hundred thousand gates.

Development of VLSIs including 16-megabit DRAMs calls for linking of fine elements by means of a complicated wiring system. One of the promising linking methods is multilayer wiring, in which circuit wires are piled up in several layers with insulating films separating them.

Interlayer insulating films serve to ease unevenness resulting from wiring formed upon a film, which is put under the insulating film itself. When developing VLSIs, to achieve evenness of the insulating film is of the utmost importance.

New Toshiba Lab Unveils Superconductivity Breakthroughs

Toshiba Corporation announced that researchers from its new advanced research laboratory have achieved three breakthroughs in the field of high-temperature superconducting ceramic materials.

The breakthroughs, which were announced by laboratory Senior Manager A. Kasami and Senior Researcher J. Yoshida, enabled Toshiba to fabricate a uniformly flat layer of yttrium barium copper oxide thin film without annealing, and to prevent the super-conducting properties of the surface from deteriorating.

Using these two advances, the Toshiba researchers then created an experimental "tunnel

liquid helium displayed "superconducting tunnelin fect," the flow of electron ross an insulator between pieces of superconducting terial.

In addition, they said recorded the world's first servation of a large vo jump, a phenomenon usef switching devices, using su conducting ceramics.

Although it has been time since the discovery of h temperature supercondu ceramics, these materials proved very difficult to f cate into electronic devices cause the high-temperature nealing process used in manufacture causes deter tion between the film and strate.

Also superconducting films made using the anne process, which reaches a te rature of approximately 9 have a rough surface that is ficult to join other thin film terials and the supercondu properties of the top part teriorate due to contact wit and moisture.

The Toshiba researchers they have developed a new rication method, called "m target reactive sputter which alleviates the nee annealing.

In this method, yttrium mic materials of barium copper, and metallic coppe targets that are bomba with an argon-oxygen gas ture. The argon ions are ed by electrical energy. strikes atoms from the and forms layers of thin up to 700 billionths of a onto substrates prehea 560°C.

The resulting thin film

a current of roughly 1 n amperes per square tmeter, has a dislocation formation within 3% giv- t a mirror like smoothness. order to prevent the sur- of the thin film from los- its superconducting proper- and thus making the junc- with other materials im- ible, the researchers added yer of silver to the surface stability.

e silver layer was formed the superconducting thin through vacuum evapora- , after which it was anneal- t 500°C while being suppli- vith oxygen. This creates a r/silver-oxide layer that ents oxygen from escaping the thin film.

Toshiba researchers said confirmed the "proximity t" in the silver layer that silver exhibited super- ucting effects even though r is not a superconducting rial.

experimental tunnel jun- fabricated by the Toshiba rchers uses lead, a low- erature super-conductor, h requires cooling with li- helium. However, it did ay the tunneling effect, h is a great step toward the ation of high-speed su- nducting switching tran-

ami said the development ctical devices based on onducting ceramics is still . off with atleast five more required to gather basic on interface characteris- hat can be applied toward e multilayered devices.

said Toshiba has applied atents for a device struc- with silver in both the U.S. , in addition to patents for w sputtering equipment

Kirin Brewery Establishes Production Technology For Synthetic Seeds

Kirin Brewery Co. Ltd. recently succeeded in cultivating F1 hybrids, produced by means of synthetic-seed technology, of both celery and lettuce, in association with Plant Genetics Inc. of Davis, California, the U.S.

The main technologies applied in the process are : (1) Mass-Production technology for somatic embryos and (2) Encapsulating technology for the embryos. Mass-Production technology for rice somatic embryos has been established as well.

The process of cultivating F1 hybrid vegetables is as follows. First, somatic embryos of celery, or adventitious shoots of lettuce, are mass-produced from an explant source, which is a part of an F1 hybrid, by means of micropropagation in a small tank. Secondly, these embryos or shoots are directly transferred to a greenhouse and grown until they are plantlets, and these are then transplanted to undergo hydroponic culture or soil culture. In the other method, these embryos and shoots are grown until they are plantlets after encapsulation.

This is the first successful example in the world of accomplishing cultivation on this scale of F1 hybrids of celery and lettuce, from which it is considered difficult to produce F1 hybrids.

The mass-production technology for somatic embryos of rice applied here, as with celery and lettuce is also a world first. This technology has been licensed to Nursery Technology Co. Ltd., who will produce the rice tissue-culture plantlets on a commercial basis, using it as technology.

These technologies were all developed in the process of R & D on synthetic-seed production technology. It will be possible to commercially produce with outstanding efficiency F1 hybrids, for which it is difficult to mass-produce seeds, and one superior plant in the course of breeding by using this mass-production technology for somatic embryos and adventitious shoots. The improvement in encapsulation technology is a big step forward in producing synthetic seeds for practical use.

From now on Kirin Brewery and Plant Genetics will individually continue R & D on : (1) Commercialisation of synthetic seeds and seedlings by reducing costs, (2) Development of synthetic seeds which can be sown directly in the fields and (3) enlarging the ranging of plant species to which the synthetic-seed technology can be applied.

Radiosensitizer For Cancer Treatment Jointly Pioneered

Pola Cosmetics Co. and Kayaku Co., have jointly developed RK-28 hypoxic radiosensitizer designed to improve the efficayc of radiotherapy for cancer treatment.

The new product - 1 - (4. hydroxy - 2 butynoxymethyl) - 2 nitroimidazole is a new type water-soluble compound that will be subjected to phase-I clinical tests this fall.

After it is orally administered to patients, its concentration within their blood reaches a peak level in 30 minutes and it enters hypoxic cells existing in middle and deep parts of cinoma, thereby improving their sensitivity to radioactive rays.

Radiotherapy is capable of producing the desired effect on the upper part of carcinoma in the presence of oxygen but cannot do so with the hypoxic middle and deep parts. Even if it temporarily shrinks carcinoma, cancer cells in the middle part often becomes active again and begin to propagate.

The two companies have obtained sufficient data on the effect of the new product by conducting preclinical trials using animal cells. The product is quickly metabolized and excreted from the human body, so there is no safety problem with it.

Conventional radiotherapy has a drawback in that carcinoma often returns because when radiation of radioactive rays exceeds the tolerable level, it has to be suspended before the carcinoma is completely removed. In addition, it also has such side effects as falling-out of a large amount of hair and destruction of normal cells. The new product is expected to overcome such disadvantages.

Production Approval For Recombinant Erythropoietin Seen Being Sought

Sankyo Co. and Kirin Brewery Co. are scheduled to jointly apply to the Ministry of Health and Welfare for production approval for erythropoietin (EPO) before the end of the year. They have conducted clinical tests on the product — erythropoiesis-stimulating factor — since the year before last. They plan to call on the ministry to aprove EPO as a remedy for renal anaemia. As a follow-up step, they will request it to authorize expansion of EPO application to blood production for patients who have undergone or are to undergo surgical operations.

Potential application of the product is limited to a cure for renal anaemia but the two companies are striving to expand it to the said field. If it is successfully expanded, the market concerned will markedly widen.

The targeted EPO is a recombinant product jointly developed by Kirin Brewery and Amgen (U.S.). The U.S. company has obtained a process patent covering the same product and has applied to the U.S. authorities for production approval for the product itself.

There are, however, patent troubles between the company and Genetics Institute (U.S.) which has a product patent on EPO and has tied up with Chugai Pharmaceutical Co.

In Japan, Toyobo and Chugai Pharmaceutical are also conducting clinical trials on EPO but they are lagging behind Sankyo and Kirin Brewery.

Titanium Alloy Applied To Artificial Teeth Base

Sumitomo Metal Industries Ltd., together with Sankin Indusry Co., an Osaka-based producer of dental materials — has developed a titanium-applied artificial teeth base using superplasticity processing technology. Sankin is scheduled to start marketing the product this fall, with approval already obta from the Ministry of Health Welfare.

The new product is li weight, free from metallic and has strong corrosion re ance and good compatib with the living tissues of human body. It is possibl precisely adjust the produc the palate: the gap between product and the palate i microns, much smaller than gap in the case of conventi artificial teeth bases.

The new teeth base is pro ced by heating 0.5 mm — t titanium alloy sheet (titan 90% ; aluminium, 6% and va dium, 4%) to 850-900°C (su plasticity temperature z and forming the resultant duct by means of argon- pressure. The superplasti processing technology conc ed has been employed for nufacture of titanium-a parts of airplanes but the companies are the first to u ze it for the production of c sumer products.

MMA resin and cobalt-c mium/nickel-chromium al have been used as artifi teeth bases but they have dr backs in thickness, low ther conductivity and elution of kel, which may cause alle Cast titanium bases are pa employed but often have holes, which tend to hold dr and result in breakage of bases themselves.

Japan's annual demand artificial teeth bases reache million pieces. It is proje to reach 7 million pieces a with the increase in the nu of aged people

ARKET INFORMATION

Solvents Come Down

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent — and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of market conditions.

The prices are Inclusive of Excise and Maharashtra Sales Tax

L and BPL have started releas- ylene and Benzene with the re- e prices have come down by - per litre. Due to non-availabi- ready goods PVA (173) and Gohsenol (GH-17) the prices have gone up by Rs. 5/- per kg. Rangolite (German) is ruling Rs. 90/- per kg and Sodium Alginate Rs. 160/- per kg.

Dyes Intermediate section MPD is still in short supply even Tobias Acid Sulpho Tobias Acid and Sulphanilic Acid are tight.

(Prices as on 11th August 1988)

TRIAL CHEMICALS	Per kg.
nium sulphate	2.00
nium phosphate (Mono)	14.50
nium phosphate (Di)	12 00
nium carbonate (Di)	17 00
nium bicarbonate	4 75
nium chloride	3.00
num nitrate	3 50
white powder	[illegible] 00
nide (Resale)	88.00
carbonate	6 00
ng powder (33% Cl)	4.00

Borax (Granular)	13.50
Borax (Powder)	21.00
Boric acid (Tech.)	22.00
Bisphenol-A	71+ST
Butyl carbitol	48.00
Caustic soda (Flakes)	9 20
Caustic soda (Solid)	8.00
Caustic soda (Lye)	7.00
Calcium chloride 70% (solid)	3 25
Calcium chloride 75-80% (fused)	3 50
Calcium chloride 36% (Anhydrous)	[illegible] 00

Calcium Carbonate PPT	[illegible] 00
Calcium carbonate (Activated)	3.55
Camphor (Indian)	82 00
Cresylic acid	50 00
Cream of Tartar (Tech.)	70.00
Citric acid (Belgium) (Resale)	43.00
Citric acid (Indian) (Resale)	42.50
Copper sulphate	21.00
Chromic acid	48.00
Cyanuric chloride	120 00
Cobalt oxide	280 00
Carbitol	60+ST

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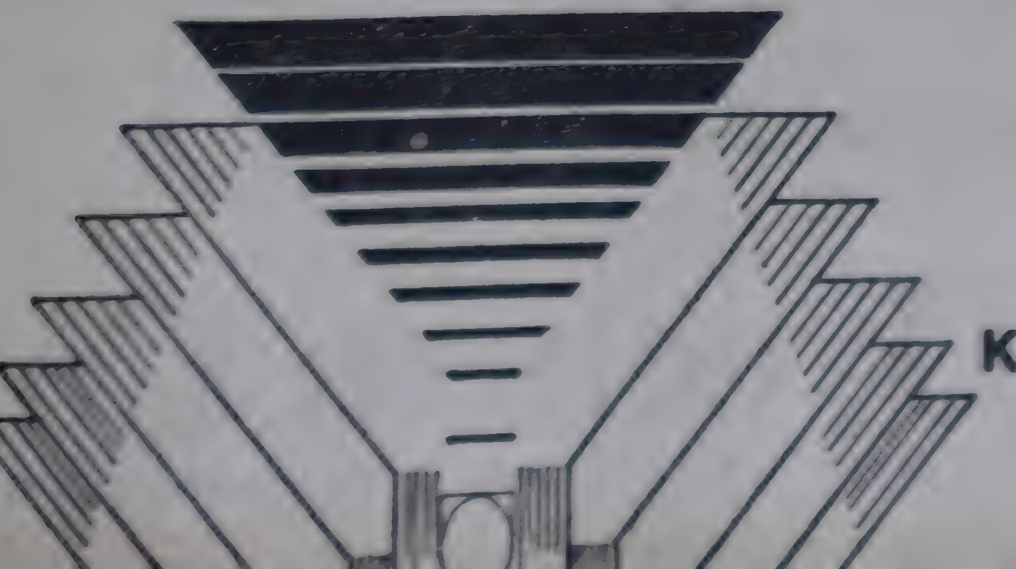

Ethylene urea	56.00
Ferric chloride (Lumps)	7.00
(Anhydrous)	16.00
Glue flakes	8.45
Glue sheets	6.75
Gohsenol GH-17	140+ST
Hydro (Resale)	41.50+ST
Hyflosupercell	24+ST
Hexamine (Resale)	35.00
Industrial Wax	25.00
Litharge	15.00
Lead Acetate (Tech)	28.00
Lithopone	15.50+ST
Magnesium chloride (Crystal)	1.00
Menthol crystal (Flakes)	185+EX.+ST
Menthol bold	205+Ex.+ST
Menthol crystal bold	245+Ex.+ST
Magnesium carbonate (Japan)	16.00
Magnesium carbonate (Indian)	15.00
Maleic Anhydride (per kg) (Resale)	55.00
Mercury (75 lbs.)	10500.00
Nickel chloride	90.00
Oxalic acid (Resale)	22.00
Peppermint oil (Rectified)	90+Ex.+ST
Potassium carbonate (Indian)	19.00
Potassium carbonate (Imported)	23.00
Potassium bichromate	22.00
Potassium phosphate (Mono)	14.00
Potassium phosphate (Di)	14.00
Polyvinyl alcohol (No. 117)	120+ST
Polyvinyl alcohol (No. 173) (Resale)	135+ST
Polyvinyl alcohol (No. 208)	150.00
Paraformaldehyde (Resale)	20+ST
Phthalic anhydride 36% (Resale)	24.00
Pentaerythritol (Resale)	51.00
Paraffin wax (Resale)	14.50
Rangolite (German)	96+ST
Rangolite (Czech.)	54+ST
Sodium sulphate (Fine)	6.00
Sodium sulphate (Coarse)	5.00
Sodium sulphide 50-52% (Flakes)	11+ST
Sodium sulphide 58-60% (Flakes) (TCL)	19.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale)	700.00
Sodium chlorite 80% (Spain)	90.00
Santobrite (Indian)	36.00
Soda Ash (Tata)	4.00
Soda Ash (Birla)	3.80
Soda Ash (Imp.)	3.50
Sodium bicarbonate	5.25
Sodium bisulphite	4.50
Sodium silicate	3.00
Sodium acetate	6.00
Sodium alginate	160+ST
Titanium Dioxide (Anatase)	55+ST
Titanium Dioxide (Rutile — RCR_2)	70+ST
Tartaric acid (Crystal)	94.00
Trisodium phosphate	4.80
Thiourea	78+ST
Urea (Tech)	2.75
Zinc Dust	30.00
Vacuum salt	1.00
Zinc Oxide	30.00
Zinc chloride powder (technical)	14.00
Zinc sulphate	4.00

SOLVENTS	Per kg.
Acetic Acid (Glacial) (Resale)	17.00
Acetic Anhydride (Resale)	25.00
Acetone (Resale)	16.00
Adipic Acid	55+ST
Aceto Acetanilide	50.00
Aniline Oil (Resale)	50.00
Benzoate Plasticiser	45.00
Butyl acrylate	88+ST
Butyl stearate	36.0
Butanol (Resale)	35.0
Benzyl Alcohol	60.0
Benzyl chloride	34.0
Benzo trichloride	16.0
Benzoyl chloride	22.0
Bromine Liquid	42.5
Chloroform	25.0
Carbon Tetrachloride	17.0
Cellosolve	45+S
Cyclohexanone	53+S
Cyclohexanol	43+S
Diacetone (Resale)	35.0
Diethyl Oxalate	34.0
Diethylene glycol (DEG)	46+S
Dioctyl Phthalate	52.0
Diallyl Phthalate	56.0
Dimethyl Phthalate	28.0
Dioctyl Adipate	52.0
Dibutyl Adipate	42.0
Dipentene	15.0
Dimethylamine 40%	12.0
Dimethylamine 60%	14.0
Ethyl Acetate	19.0
Ethyl Acrylate	54.0
Ethylene Dichloride	11.0
Ethylene Glycol	45+S
Formic Acid (Imp) (Resale)	29.0
Formaldehyde (Resale)	6.0
Glycerine (CP)	53.0
Glycerine (IW)	48.0
Hydrogen peroxide 50% (Resale)	29.0
Isopropyl Alcohol	21.0
Iso Butyl Alcohol	28.0
(Resale)	30.0
Monoethanolamine (Resale)	52.0
Melamine	50+S
Methyl Ethyl Ketone	55.0
Methyl Isobutyl Ketone	36.0
Methyl Acrylate	42.0
Methyl Dichloride (Resale)	23.0

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N-Methyl Aniline	120
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Ortho Anisidine (OA Imp.)	85
Ortho Dichloro Benzene (ODCB)	11
OT Base	100
Para Dichloro Benzene (PDCB)	17
Para Anisidine (PA-Imp.)	110
Para Anisidine (PA-Local)	90
PNA	70
Para Cresidine (Imp.)	335
Para Amino Azo Benzene (India)	130
PNCB	34
Para Amino Acetanilide	45
1-Phenyl 3-methyl-5 Pyrazolone	120
Phenyl J. Acid	345
Para Amino Benzoic Acid	170
PT Base	88
Rhoduline Acid	500
Resist Salt	22
Resorcinol	145
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Acid Orange IIY	63.05
Acid Red A	107.25
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Acid Scarlet 3R	99.90
Acid Red 38N	135.00
Acid Red R2R	132.00
Acid Red RS	88 00
Acid Green V	230.00
Acid Patent Blue AS	250.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
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Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

DIRECT COLOURS	Per Kg.
Yellow 3GX	88.10
Gun Yellow RCH	124.00
Fast Yellow GCH	141.15
Yellow CFG Hly. Conc.	312.00
Fast Yellow GS	111.65
Fast Yellow CHRS	95.45
Viscose Orange A	166.15
Fast Orange GR	133.75
Red	96.90
Dark Tan	78.25
Red IIR	72.55
Red 4B	169.10
Bordeaux BW	132.30
Fast Scarlet 4BS	166.55
Red 12B	170.55
Bordeaux Hly. Conc.	194.00
Cotton Red N	117.05
Brill. Fast Helio B	278.00
Brill. Fast Helio 2B	297.00
Brill. Fast Helio 2RS	136.20
Brill. Fast Helio BS	116.10
Brill. Violet Extra	128.40
Blue 2B	86.60
Blue G	170.50
Sky Bue FB	188.25
Copper Blue GR	147.00
Fast Greenish Blue GL	114.60
Developed Black BT	116.10
Blue NB-2B	300.20
Blue NB-2BC	185.30
Developed Black NB-GHB	185.30
Green B	111.65
Green NB-B	188.25
Green 2B-N	188.25
Brown MR	154.40
Brown CN	107.25
Golden Brown G	140.35
Catechin G	120.50
Omega Tan	126.40
Catechin GS	102.80
Black E Hly Conc.	142.60
Black E Extra Hly. Conc.	142.60
Black NB-ER Hly. Conc.	310.50

DISPERSOL COLOURS	Per Kg.
Yellow 6G Powder	143.80
Red B 3B Powder	247.80
Red B 2B Powder	323.20
Red CB Powder	439.15
Red D2B Powder	477.40
Violet C 4R	521.90
Blue BG Powder	235.45
Blue BN Powder	103.75
Blue D 2R Powder	476.25
Navy BT Powder	243.90
Blue B 2G Powder	210.20
Black BT Powder	182.60
Blue BR Powder	390.20
Yellow 7GL	338.60
Yellow 5RX	218.80
Yellow 3G	367.25
Yellow	140.00
Yellow AL	135.30
Yellow Brown REL	247.50
Yellow FFL	463.60
Gold Yellow GG	259.70
Pink REL	247.00
Red REL	468.65
Red 2B	327.40
Red FB	324.20
Red Violet FBL	469.85
Orange 3R	196.65
Violet 3R	280.00
Violet RL	275.45
Violet 6R	485.75
Scarlet RR	214.80
Rubine 3B	223.00
Rubine CB	364.90
Blue GL	318.90
Blue BGF	636.50
Navy Blue RF	270.40
Brown 3REL	200.40
Black GEL	324.20
Dark Brown 8B	317.40

BASE COLOURS	Per Kg.
Fast Yellow GC	80.20
Fast Orange GC	135.45
Fast Scarlet R	166.90
Fast Scarlet RC	126.65
Fast Scarlet RCR	99.05
Fast Scarlet G	121.65
Fast Scarlet GN	91.50
Fast Scarlet GG	72.70
Fast Scarlet GGS	72.75
Fast Red B	203.20
Fast Red RC	119.15
Fast Red R Flakes	149.25
Fast Red TR	166.80
Fast Red TR Oil	183.15
Fast Red RL	237.10
Fast Red KB Oil	201.90
Fast Bordeaux GP	201.95
Fast Garnet GBC	94.00
Fast Violet B	505.60
Fast Blue BB	521.40

NAPHTHOL COLOURS	Per Kg.
ASG	217.00
AS	143.00
ASSW	.279.75
ABBS	189.15
ASBO	195.65
ASD	175.50
ASOL	179.35
ASTR	279.75
ASPH	279.75
ASE	196.05
ASEI	184.40
ASLB	1632.60
ASBT	1817.00
ASWG	143.00
ASSG	397.70
ASSR	480.50

PROCION COLOURS	Per Kg.
Golden Yellow HR	181.80
Brill. Yellow H4G	117.85
Supra Yellow H-8GP	168.55
Brill. Yellow HE6G	166.95
Yellow H-E4R	276.05
Brill. Yellow H7G	332.30
Yellow M4R	243.95
Yellow M GR	326.05
Brill. Yellow M4G	177.10
Brill. Yellow M8G	332.30
Yellow M 3R	217.60
Brill. Orange H 2R	241.85
Brill. Red H 7B	157.95
Brill. Orange M 2R	313.15
Brill. Red H 8B	169.45
Brill. Scarlet H RN	245.05
Supra Red H-3BP	179.30
Brill. Red H-F3B	243.45
Brill. Magenta HB	167.00
Brill. Red M 5B	98.90
Brill. Red M 8B	173.70
Brill. Pink MB	137.10
Brill. Magenta MB	121.55
Brill. Purple H-3R	180.20
Brill. Purple H-7R	175.40
Navy Blue H 3R	298.50
Brill. Blue H-GR	366.55
Brill. Blue H 5G	173.10
Blue H 5R	283.85
Brill. Blue H 7G	178.70
Brill. Blue H 7RX	358.15
Turquoise HA	234.45
Supra Blue H-3RP	335.70
Supra Turquoise H 2GP	181.50
Blue H-ERD	305.80
Navy Blue H ER	258.60
Blue H 5RX	369.30
Navy Blue M 3R	310.95
Brill. Blue MR	331.70
Brill. Blue M RX	214.20
Brill. Blue M-G	382.30
Blue M 4GD	344.60
Navy Blue M RB	318.75
Turquoise M-G	197.85
Brill. Blue M GX	302.50
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide (per kg.)	285.00
Green H 4BD	269.80
Green H-E4BD	169.80
Red Brown H IF	143.25
Orange Brown H 2R	209.05
Brown M GRN	188.80
Black H-N	283.35

SULFUR COLOURS	Per Kg.
Navy Blue	99.85
Green G	198.55
Black Grains Extra	63.05
Black Grains OG	64.55
Black GXE Conc.	61.60
Black GXE	52.75
Black GXR	61.60
Black Grains 800	54.20
Black EXR Grains	64.55
Black EXR Grains 800	51.25

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Powder Fine	673.15
Yellow 5G Supra Disperse	439.30
Yellow 5G Acra Con.	628.75
Yellow 3R Powder	588.85
Gold Orange 3G Pdr. Fine	952.15
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp.	601.30
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	997.80
Brill. Red 3B Supra Disp.	713.20
Brill. Purple 4R Conc. Pdr.	470.75
Brill. Purple 3R Acra Powder	690.85
Brill. Purple 2R Hly Conc.	597.90
Brill. Purple 4R Supra Disp.	500.05
Brill. Purple 2R Acra Conc.	625.95
Blue R Powder Fine	542.15
Blue BC Conc. Pdr. Fine	522.50
Blue BC Acra Conc. Pdr. Fine	762.70
Blue R Conc. Pdr. Fine	577.65
Blue RR Supra Powder	629.35
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	389.25
Blue BC Supra Disp.	359.40
Jade Green XBN Powder Fine	438.20
Jade Green XBN Acra Conc. Powder	823.90
Jade Green 2G Pdr. Fine	419.65
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	496.00
Olive Green B Pdr. Fine	399.90
Olive D Pdr. Fine	444.30
Olive Green B Supra Disp.	308.26
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Pdr. Fine	698.55
Olive OMW Supra Disp.	538.05
Olive R. Pdr. Fine	422.96
Olive D Supra Disp.	361.70
Olive R Supra Disp.	363.90
Olive D. Ptg. Paste	193.00
Olive Green B. Ptg. Paste	199.10
Olive Green B Acra Conc.	542.75
Olive R Acra Conc.	640.00
Olive Green B Acra Conc.	542.75
Brown R Pdr. Fine	835.00
Brown G. Pdr. Fine	795.00
Brown R Pdr. Fine	659.75
Dark Brown 3R Pdr Fine	685.00
Brown G. Supra Disp.	449.90
Brown 2G Supra Disp.	554.00
Brown R Supra Disp.	422.95
Brown BR Powder	719.00
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	414.55
Brown G Acra Conc.	738.95
Brown R Acra Conc.	786.00
Grey M. Powder Fine	[illegible]
Grey M. Supra Disp.	585.48
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	330.35
Direct Black AC Pdr. Fine	474.70
Direct Black CH Supra Disp.	393.20
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI; AUGUST 12 (NNS) — Menthol prices spurted sharply by Rs. 17/30 per kg. In the Delhi chemicals market during last week, on account of heavy demand shown by stockists and exporters and fall in arrivals from UP, reports NNS. Citric acid also advanced by Rs. 50/100 while caustic soda flakes and tartaric acid resumed lower on fall in demand. Turnover was moderate.

Menthol medium and bold jumped up sharply by Rs. 30 each at Rs. 255 and Rs. 265 per kg. respectively, due to restricted arrivals from Uttar Pradesh along with brisk purchasing made by stockists and exporters. Menthol flakes also shot up by Rs. 17 at Rs. 222 per kg on stocking tendency. Mentha oil moved up by Rs. 10 at Rs. 175.

Camphor thal jumped up by Rs. 2 at Rs. 102 due to tight supply from manufacturers along with heavy demand for ensuing festivals. Camphor powder improved by Re. one at Rs. 88. Acetic acid glacial firmed up by rupee one at Rs. 14/14.50 on poor inflow.

Citric acid advanced by Rs. 50/100 at Rs. 2100/2400 on reduced supply from Bombay Dyeing. Tartaric acid softened by Rs. 25 at Rs. 6000 per 50 kg. on slack demand due to rains. Caustic soda flakes, however was cheaper by Rs. 2/5 at Rs. 398/400 on easy supply.

Paraffin wax locked up by Rs 10 at Rs 64 per kg on poor supply from Assam due to floods. Ammonia bicarb also moved up by Rs 5 at Rs 135 on brisk buying by bakeries.

Titanium dioxide Anatase and RC-822 were traded at Rs 56 and Rs 74 per kg. with support from the buyers. Formic acid increase by Rs 10 at Rs 900 (per 50kg.) on sustained demand.

Among dyes and colours, Naphthol AS, ASG, ASBS, ASTR, ASOL, and ASBO prices went up sharply by Rs. 8/14 per kg. caused by hike in its prices by companies. Similarly Black E Conc, Diazo black BT and green B and Blue B-2 quoted higher by Rs. 5/8 per kg. on due to hike in its prices by manufacturers. Sky Blue FB hardened from Rs. 200.15 to Rs. 213. and Basic Auramine sold higher at Rs. 110 against Rs. 100. Basic Malachite green, however, dropped by Rs. 20 at Rs. 140/165. Acid orange sold higher at Rs. 45/88 per kg, on good enquiries by consumers.

(DELHI MARKET RATES AS ON AUGUST 12, 1988)

Ammonia Bicarb (per 25 kg)	135.00
Mercury (per flask)	11,000.00
Soda ash (per bag)	270-300.00
Ammonium chloride (per 50 kg)	125-180.00
Caustic soda solid	No Stock
Caustic soda flakes (per 50 kg)	398-400.00
Citric acid (per 50 kg)	2100-2400.00
Stable Bleaching Powder Shriram (per 25 kg)	95.00
Stable Bleaching Powder KCl (per 25 kg)	86.00
Stable Bleaching Powder MODI (per 25 kg.)	88.00
Sod. Bicarbonate (per 50 kg)	265-275.00
Sod. Hydro Sulphite (per kg)	38-43.00
Rongolite (per kg)	50-70.00
Boric acid Technical (per 50 kg)	1015.00
Paraffin wax (per 50 kg)	640.00
Tartaric acid (per 50 kg)	6,000.00
Borax Granular (per 50 kg)	550.00
Borax Crystal (per 50 kg)	575.00
Sodium Nitrate (per 50 kg)	430.00
Sodium Nitrite (per 50 kg)	675-700.00
Camphor Powder (per kg)	88.00
Camphor Thal (per kg)	102.00
Menthol Medium (per kg)	265.00
Menthol Flakes (per kg)	222.00
Menthol Bold (per kg)	265.00
Glycerine (per kg)	47-48.00
Sodium Silicate (per quintal)	200-250.00
Hexamine (per kg)	42.00
Acetic Acid Glacial (per kg)	14-14.50
Copper Sulphate (per quintal)	2100-2300.00
Formic acid (per kg)	26
Formaldehyde (per kg)	
Hydrogen Peroxide (per kg)	27-2
Calcium Carbonate (per tonne)	2500-400
Acid Slurry Soft (per kg)	24
Acid Slurry Hard (per kg)	32
Phosphoric Acid (per 50 kg)	900
Pot. Nitrate (per quintal)	900-120
Pot. Permanganate (per 50 kg)	230
Sod. Bichromate (per 50 kg)	1050-1150
Tri-Sod. Phosphate (per 50 kg)	350-380
Titanium Dioxide Anatase (per kg)	56
Titanium RC-822 (per kg)	74
Zinc Oxide (per mt)	35,000-42,000
Phenol Carbolic Acid (per kg)	33
Carbon Tetrachloride (per kg)	20
Chloroform (per kg)	28
Sodium Sulphate (per 50 kg)	160-170
Naphthalene Balls (per 50 kg)	1350

DYES & COLOURS	(per
Naphthol AS	158
Naphthol ASG	249
Naphthol ASBS	210
Naphthol ASTR	320
Naphthol ASOL	202
Naphthol ASBO	220

DIRECT DYES	(per
Black E. Conc.	110-160
Diazo Black MT	105-130
Green B	100-127
Blue 2-B	60-9
Sky Blue FB	21
Basic Auramine	55-110
Basic Rhodamine	220 32
Basic Methylene Blue	82-13
Basic Violet	142 1
Basic Malachite Green	140-16
Acid Orange	45-8

Madras Market

There was good activity during the eek. Acetic acid prices spurted on e news that the demand from PTA anufacturer is good and this has re-ulted in a shortage. Hydros prices ased on good supplies from manufac-rers. Petroleum solvents like benz-ne, toluene and xylene continues to be under short supply. The continued strike at Hindustan Lever Bombay unit has affected Glycerine availability substantially and the prices are ruling high. In the Dyes section vat prices have gone up on reported shortage due to exports.

(MADRAS MARKET RATE AS ON AUGUST 13, 1988)

cetic Acid Glacial (per kg)	18.75
uminium Sulphate Iron Free (per MT)	1900.00
nmonium Bicarbonate (per 25 kg)	130.00
id Slurry Soft (per kg)	27.00
nmonium Chloride SPIC (per MT)	2,600.00
aching Powder (per 25 kg bags)	110.00
ax Granular (per 50 kg)	650.00
ustic Soda Flakes — Mettur Chemicals (per MT)	8,600.00
ustic Soda Flakes — Andhra Sugars (per MT)	8,600.00
ic Acid (per kg)	45.00
er Sulphate (per 50 kg)	1000.00
sylic Acid 98/99% per kg)	87 + ED
Cresol 40/42% per kg)	39 + ED
Cresol 80/85% (per kg)	67 + ED
nic Acid (per kg)	27.00
naldehyde (per kg)	9.00
erine (per kg)	52.00
Hydrosulphite of Soda — TCPL (per kg)	39.00
Hydrosulphite of Soda — IDI (per kg)	42.00
Hydrosulphite of Soda — BASF (per kg)	45.00
Hydrogen Peroxide (per kg)	30.00
Hyflo Supercell (per kg)	19.50
Magnesium Carbonate (per kg)	18.00
Potassium Bichromate (per kg)	26.00
Phosphoric Acid (per kg)	19.50
Phthalic Anhydride (per kg)	22.00
Pentaerythritol (per kg)	52.00
Paraffin Wax (per kg)	13.50
Oxalic Acid (per kg)	25.00
Soda Ash — TAC (per 75 kg bags)	320.00
Soda Ash — TATA (per 75 kg bags)	325.00
Sodium Cyanide Indian (per kg)	55.00
Sodium Cyanide (Degussa) (per kg)	85.00
Sodium Bichromate (per kg)	18.00
Sodium Bicarbonate (per 50 kg bags)	290.00
Sodium Nitrate (per 50 kg bags)	450.00
Sodium Nitrite (per 50 kg bags)	750.00
Sodium Silicate (per MT)	4500.00
Sodium Sulphate (per MT)	3500.00
Sodium Sulphide Flakes (per MT)	12000.00
Sodium Bisulphite (per 50 kg)	190.00
Stearic Acid (per kg)	30.00
Trisodium Phosphate (per 50 kg)	390.00
Titanium Dioxide — Indian TTP — (per kg)	48.00
Titanium Dioxide — Indian (Rutile) (per kg)	58.00
Urea Tech (per MT)	2800.00
Zinc Oxide (per kg)	34.00
Zinc Chloride Powder (per kg)	13.00
Zinc Sulphate (per MT)	5,000.00
Di-octyl Phthalate (per kg)	42.00
Di-butyl Phthalate (per kg)	42.00
Hexamine (per kg)	34.00

SOLVENTS

Acetone — HOCL — (per kg)	19.00
Acetone — NOCIL — (per kg)	22.00
Diacetone (per kg)	29.00
Diethylene Glycol (per kg)	48.00
Isopropyl Alcohol (per kg)	22.00
Butanol (per kg)	34.00
Benzene — SAIL — (per lit.)	17.00
Toluene — SAIL — (per lit.)	16.00
Xylene — SAIL — (per lit.)	16.00
Phenol — HOCL — (per kg)	29.00
Turpentine (per lit.)	16.50
Trichloroethylene — MCIC — (per kg)	23.50
Carbon Tetra Chloride (per kg)	16.00
Chloroform (per kg)	26.00
Methylene Chloride (per kg)	25.00
Methanol (per kg)	11.00
Methyl Ethyl Ketone (per kg)	48.00
Cellosolve (per kg)	52.00
Butyl Acetate (per kg)	42.00
Ethyl Acetate (per kg)	23.00
Triethanolamine (per kg)	23.50
Sorbitol (per kg)	35.00

MATERIALS IMPORTED

BOMBAY

(From 22.2.88 to 29.2 88)

ACETIC ACID: From France: Shivalik Bimetal Controls Ltd., 60 lbs., Rs. 1,496.

ACETONE: From Canada: D & H Secheron Electrodes Pvt. Ltd., 496 ltrs., Rs. 16,111.

ACRYLAMIDE: From Japan: RSA Polymers, 3,000 kgs., Rs. 64,267.

ALBENDAZOLE: From China: Wockhardt Veterinary Pvt. Ltd., 300 kgs., Rs. 2,46,357.

ALDEHYDE C-16: From Switzerland: Naarden (India) Ltd., 100 kgs., Rs. 23,297.

ALDEHYDE C-18: From Switzerland: Naarden (India) Ltd., 50 kgs., Rs. 14,726.

ALPHA ACETO GAMMA BUTYRO LACTONE: From Japan: Indian Drugs & Pharmaceuticals Ltd., 15,000 kgs., Rs. 13,68,421.

D-ALPHA PHENYL GLYCINE CHLORIDE HYDROCHLORIDE: From Italy: Lyka Labs Ltd., 2,000 kgs., Rs. 6,51,167; From Netherlands: Gujarat Lyka Organics Ltd., 5,775 kgs., Rs. 18,80,244; From Switzerland: Ranbaxy Laboratories Ltd., 5,460 kgs., Rs. 18,36,942.

ALUMINIUM OXIDE SYNTHETIC: From Japan: Grindwell Norton Ltd., 5,000 kgs., Rs. 1,79,213.

ANILINE OIL: From FRG: Cibatul Ltd., 18,400 kgs., Rs. 2,43,670; Jindal Dye Intermediate P. Ltd., 11.73 mts., Rs. 1,55,339; From Saudi Arabia: Grover Overseas P. Ltd., 12,960 kgs., Rs. 1.51.437: From UK: Minir Chemicals, 6,240 kgs., Rs. 72,914.

ANISALDEHYDE: From Switzerland: The Bharat Indl. Corporation, 9 kgs., Rs. 4,670.

AROMATIC CHEMICALS: From France: Dept. of Atomic Energy, 20 kgs., Rs. 8,827; Oriental Aromatics, 100 kgs., Rs. 28,855; 200 kgs., Rs. 24,045; 360 kgs., Rs. 70,116; From Korea: Dome Bell Investment Pvt. Ltd., 125 kgs., Rs. 19,293; From Netherlands: S. H. Kelkar & Co., Ltd., 10 kgs., Rs. 11,531; From Switzerland: International Health Care Prod., 1,520 kgs., Rs. 5,74909; Mysorewala Sugandhi Dhoop Factory, 51 kgs., Rs. 30,195; From UK: Shah Agarbathi & Co., 292 kgs., Rs. 69,112.

ATRAZINE TECHNICAL: From UK: Rallis India Ltd., 19,995 kgs., Rs. 9,32,145.

BENZYL CYANIDE: From Denmark: FDC Pvt. Ltd., 2,000 kgs., 79,198.

BISPHENOL A: From Brazil: Zenith Ltd., 20 Mts., Rs. 2,82,872; From Netherlands: National Organic Chemical Ind. Ltd., 10 mts., Rs. 2,08,887.

BUTACHLOR TECH: From Finland: Newsprint Trading & Sales Corpn., 34,920 Lbs., Rs. 6,16,590; From USA: Herbicides (India) Ltd., 15,839.6 kgs., Rs. 6.07,523.

BUTYL ACETATE: From Japan: G.C. Rescroth Inds., Ltd., 240 Lts., Rs. 14,532.

BUTYL ACRYLATE: From FRG: BASF India Ltd., 5,940 kgs,. Rs. 1,11,748.

BUTYLATED HYDROXY ANISOLE: From Japan: Tata Exports Ltd., 500 kgs., Rs. 90,883.

BUTYLATED HYDROXY ANISOLE (FOOD GRADE): From Japan: 250 kgs., Rs. 52,957.

BUTYL LACTATE: From UK Ami Essence & Perfumers, 20 kgs., Rs. 6,885.

N-BUTYL METHACRYLATE From Japan: Asian Paints Indi Ltd., 3,060 kgs., Rs. 99,321.

CALCIUM BORATE: Fror Norway: Viraj Industries, 1,50 Mts., Rs. 46,54,105.

CALCIUM CARBIDE: From Pc land: Industrial Oxygen Co. Pvt Ltd., 1,89,500 kgs., Rs. 10,89,871.

CALCIUM FLUORIDE: Fror Japan: Sylvania & Laxman Ltd 400 kgs., Rs. 30,078.

CALCIUM FLUORO CHLOR PHOSPHATE: From UK: Moo Tin Containers Pvt. Ltd., 14,80 kgs., Rs. 7,55,936.

CALCIUM SILICIDE: Froi France: Greaves Foseco Ltd 2,975 kgs., Rs. 60,268; Froi FRG: Steel Strips Ltd., 2 Mts Rs. 33,178.

CAPROLACTUM: From Belg um: NRC Ltd., 166.5 Mt., Rs 40,85,633; From Italy: The Bar da Rayon Corporation Ltd., 311 Mts., Rs. 76,46,146; From N therlands: Jagatjit Cotton Texti Mills Ltd., 2,55,000 kgs., R 62,57,275; From Netherland Modi Rubber Ltd., 3,06,000 kgs Rs. 75,08,731.

CARBOFURAN: From US Rallis India Ltd., 9,000 kgs., Rs 14,71,131.

CARNAUBA WAX: From Br zil: Everest Paint Industries, 10 000 kgs., Rs. 1,94,749.

CAUSTIC SODA FLAKE From Korea: The Standard Mil Co. Ltd., 143 Mts., Rs. 6,91,54 From Netherlands: Hindustan L ver Ltd., 143 Mts., Rs. 6,91,5

CAUSTIC POTASH FLAKE From Italy: Indian Dyestuff Ind Ltd., 119.825 Mts., Rs. 10,37 664.

CELLULOSE ACETATE: Fr USA: Hind Filters P. Ltd., 3,9

CELLULOSE ACETATE PHTHALATE: From FRG: Hoechst ndia Ltd., 400 kgs., Rs. 2,41,82.

CHLORDANE TECH.: From JSA: Pest Control (India) Pvt. td., 2,045.72 kgs., Rs. 1,08,-912.

2-CHLORO 2,6 DIETHYL N BUTOXYMETHYL) ACETANILIDE: From Korea: Calcem Electronics P. Ltd., 69,840 Lbs., Rs. 2,33,180; From USA: Monsanto hem. of India Ltd., 69,840 Lbs., s. 12,33,180.

CINNAMIC ALDEHYDE: From witzerland: The Bharat Indl. orporation, 105 kgs., Rs. 21,-59.

CITRIC ACID: From China: leena Chemical Industries, 20 ts., Rs. 3,36,266.

COCOAMINE: From UK: Dai hi Karkaria Ltd., 2,028 kgs., s. 79,234.

2 CYANOPYRAZINE: From an: JR Brothers, 400 kgs., Rs. 25,058.

CYCLOHEXANONE: From Chi-: Hindustan Ciba Geigy Ltd., ,800., Rs. 14,27,741.

CYCLOHEXYL MERCAPTAN: om Netherlands: Polyolefins d. Ltd., 21,000 kgs., Rs. 7,19,-1.

DELTA TETRADECALACTONE: om UK: Ami Essence & Perners, 5 kgs., Rs. 18,563.

DESMOPHEN: From Belgium: Templow Insulation P. Ltd., 75 Mts., Rs. 1,29,800; Num Industries, 14.48 Mts., Rs. 6,912; From FRG: Tirupati ms Pvt. Ltd., 10.750 Mts., 1,29,800.

4 DICHLORO ANILINE: From G: Bela Plastics, 5,000 kgs., 2,81,106.

4 DICHLORO BENZOIC ID 99% MIN: From Japan: or Chemicals, 500 kgs., Rs. 073.

DICUMYL PEROXIDE: From USA: Ganga Phosphorus & Chemicals Ltd., 10,000 kgs., Rs. 1,62,291.

DICYANDIAMIDE: From FRG: Orex Pharma Pvt. Ltd., 16 Mts., Rs. 3,84,586.

N-N DIETHYL ANILINE: From Japan: Colour Chem. Ltd., 1,080 kgs., Rs. 57,926; M.S. Intermediates, 4,180 kgs., Rs. 2,48,373.

DIETHYL ANILINE: From Japan: M.S. Intermediates, 4,180 kgs., Rs. 2,48,373.

DIETHYL CARBONATE: From France: Indian Drugs & Pharmaceuticals Ltd., 3,960 kgs., Rs. 1,73,576.

3,3 DIETHYL 2,4 DIOXOTETRA HYDROPYRIDINE: From Switzerland: Roche Products Ltd., 1,600 kgs., Rs. 10,95,064.

DIETHYLENE DIAMINE: From FRG: Fine Chemicals, 4,370 kgs., Rs. 1,25,264.

DIETHYL SULPHATE: From Japan: Advent Dyes and Chemicals, 15,640 kgs., Rs. 2,81,264; PDI Chemicals P. Ltd., 5,060 kgs., 93,125.

DIHYDROMYRCENOL: From France: Oriental Aromatics, 180 kgs., Rs. 19,909.

DI ISOPROPANOLAMINE: From France: National Organic Chemical Ind. Ltd., 10 Mts., Rs. 2,90,453.

DIMETHYLAMINOETHYL ACRYLATE: From USA: RSA Polymers, 181.44 kgs., Rs. 13,191.

DIMETHYL CARBONATE: From France: Ganesh Medicament Pvt. Ltd., 5,000 kgs., Rs. 1,32,249.

DIMETHYL FORMAMIDE: Japan: Camel Knitting & Textiles Mill, 3,040 kgs., Rs. 43,160; M. J. Exports Pvt. Ltd., 3,230 kgs., Rs. 45,858; From Iran: Paras Trading Co., 4,750 kgs., Rs. 53,037; From Japan: Tata Exports Ltd., 5,890 kgs., Rs. 83,-

Sajjan
623; The Anup Eng. Ltd., s., Rs.
kgs., Rs. 43,160.

DIMETHYL SULPHOCHLO- From Hungary: Precision D Chemical Equipments, 7,980 kgs., Rs. 1,-879; From UAE: Balkrishna F Jo- Mills Ltd., 7,430 kgs., Rs. 1, bs. 879; From USA: German Rer dies Ltd., 5,000 kgs., Rs. 1,1L: 253. ff

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DI OCTYL PHTHALATE: From FRG: Arjun Impex, 15,600 kgs., Rs. 1,62,030; From Italy: Electronic Circuits Ltd., 15,600 kgs., kgs., Rs. 1,62,030.

DI OCTYL TIN OXIDE: From Japan: Gandhi Parekh Investment Corp. Ltd., 1,000 kgs., Rs. 1,09,839.

DIPHENYL OXIDE TECH: From USA: Pradhan Perfumers, 2,800.98 kgs., Rs. 61,095; Sharvani Pharls. Ltd., 1,077.3 kgs., Rs. 23,498; From FRG: Shika International, 5,000 kgs., Rs. 97,-375.

DIVINYL BENZENE: From USA: Henkel Chemicals Ltd., 11,-031.37 kg., Rs. 8,07,778.

EPOXY RESIN: From Japan: Usha Electronics India Pvt. Ltd., 760 kgs., Rs. 68,344.

ETHYL CAPRYLATE: From Switzerland: The Bharat Indl. Corporation, 15 kgs., Rs. 6,190.

ETHYL CELLULOSE: From USA: Ajay Electrical Inds. Ltd., 498.96 kgs., Rs. 76,549; M.S. Patel & Co., 567 kgs., Rs. 75,-456.

N ETHYL CYCLOHEXYLAMINE: From FRG: Umpatel Rubbers Ltd., 170 kgs., Rs. 11,774.

ETHYLENE GLYCOL MONO-ETHER: From FRG: Dura Chemical Corpn. P. Ltd., 15,288 kgs., Rs. 2,16,497.

ATE: From harat Indl. 5,387.

E: From UK: Perfumers, 20

ILLIN: From Fran- dia Ltd., 100 kgs., From Switzerland: at Indl. Corporation, s., Rs. 2,86,686.

ENOL: From Singapore: ta Oil Mills Co. Ltd., 2,000 Rs. 1,55,799.

ERRIC OXIDE: From FRG: osmo Ferrites Ltd., 20,000 kgs., Rs. 5,80,953.

FORMIC ACID 85%: From FRG: Quality Carpet Traders, 50,995 kgs., Rs. 3,70,103.

FURAZOLIDONE: From Hungary: Seva Enterprises, 16,500 kgs., Rs. 15,79,365.

FURFURYL ALCOHOL: From Belgium: Nirval Keramchemie Pvt. Ltd., 1,680 kgs., Rs. 37,080.

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GERANIO NITRILE : From France: Oriental Aromatics, 360 kgs., Rs. 1,38,501.

GLYCEROL: From Malaysia: Suparna Chem. Pvt. Ltd., 15,000 kgs., Rs. 2,62,911.

GLYOXAL: From FRG: Unique Pharm. Labs., 7.7 Mts., Rs. 79,177; From Japan: M.K. Marketing, 8 Mts., Rs. 87,378.

GUM ARABIC: From Saudi Arabia: Grover Overseas P. Ltd., 50 kgs., Rs. 8,12,987; From Singapore: Weston Electronics Ltd., 50 kgs., Rs. 8,12,987.

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IONOMER RESIN: From USA: Essel Packaging Ltd., 1,134 kgs., Rs. 32,458.

ISOBORNYL ACETATE: From FRG: Dujodwala Udyog Ltd., 9. Mts., Rs. 1,45,080.

ISO CAMPHYL CYCLOHEXANOL: From Switzerland: Naarden India Ltd., 50 kgs., Rs. 11,868.

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LYRAL: From Netherlan Hindustan Lever Ltd., 1,200 k Rs. 3,63,351.

L-LYSINE MONO HCL: F Japan: Avet Chemicals Pvt. L 1,000 kgs., Rs. 38,950; From pan: Mangalaya Trading &

stment., 2,000 kgs., Rs. 1,18,-
7; From Japan: Salvi Chemi-
ls Inds., 1,500 kgs., Rs. 56,-
7; Sarabhai International Ltd.,
00 kgs., Rs. 59,723.

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asim Indus. Ltd., 75.35 Mts.,
. 5,90,737; From Japan: Sat-
m Rubber Inds. 75.35 Mts.,
. 5,90,737.

MALONITRIDE HOMOVERA-
RYLAMINE: From Switzerland:
oche Products Ltd., 100 kgs.,
. 24,659.

MANGANESE DIOXIDE: From
SA: Central Electronics Ltd.,
1.8 Mts., Rs. 5,98.618.

PARAQUAT DICHLORIDE :
om Taiwan: Herbicides (India)
d., 5,000 kgs., Rs. 2,53,174.

METHACRYLIC ACID: From
pan: PDI Chemicals P. Ltd.,
0 kgs., Rs. 27,974.

METHANOL: From Malaysia:
e State Trading Corpn., 2023.
38 Mts., Rs. 49,40,485.

DL METHIONINE: From USA:
K. Chemical Inds. 3,000
s., Rs. 1,16,849.

METHYL CELLULOSE: From
K: E. Merck India Ltd., 500 kgs.,
. 42,030.

4-METHYL 1 (3 CHLORO
ROPYL) PIPERAZINE HCL :
om UK: May & Baker (I) Ltd.,
0 kgs., Rs. 1,52,220.

N-METHYL PIPERAZINE: From
weden: Industrial Trading Co.
190 kgs., Rs. 1,82,740.

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d., 816.45 kgs., Rs. 30,638.

N-METHYL PIPERAZINE: From
G: Burroughs Wellcome India
d., 3,400 kgs., Rs. 5,45,655.

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om FRG: Samir Dyechem: 49-
5 kgs., Rs. 48,638; Enkay India
ubber Co. Pvt. Ltd., 2,688 kgs.,
. 55,838; From Spain: United
em. & Soap Mills 991 kgs.
. 14,500.

MOLYBDENUM DISULFHIDE: From FRG: Indian Oil Corporation Ltd., 2,000 kgs., Rs. 2,37,472.

MONO ETHYLENE GLYCOL: From Saudi Arabia: Century Enka Ltd., 1029,992 Mts., Rs. 68.86,910; Orkay Silk Mills Ltd., 1029.992 Mts., Rs. 53,22,311; Reliance Inds. Ltd., 3089.96 Mts., Rs. 2,61,34,292.

MORPHOLINE: From USA: Polyolefins Inds. Ltd., 15.023 Mts., Rs. 3,53,036; The Universal Traffic Co., 15,023 kgs., Rs. 3,58,887.

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OLEYL CETYL ALCOHOL: From FRG: Dai Ichi Karkaria Ltd., 3,060 kgs., Rs. 77,292.

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POLYETHYLENE GLYCOL : From FRG: IVP Ltd., 2,000 kgs., 81,480.

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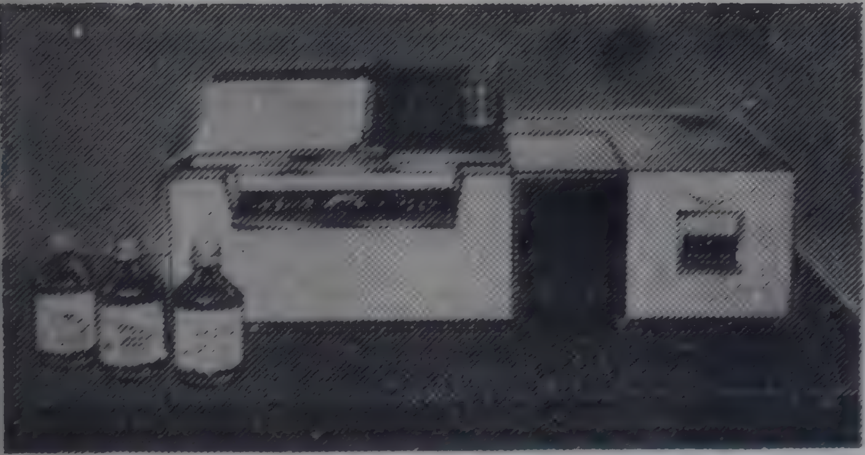

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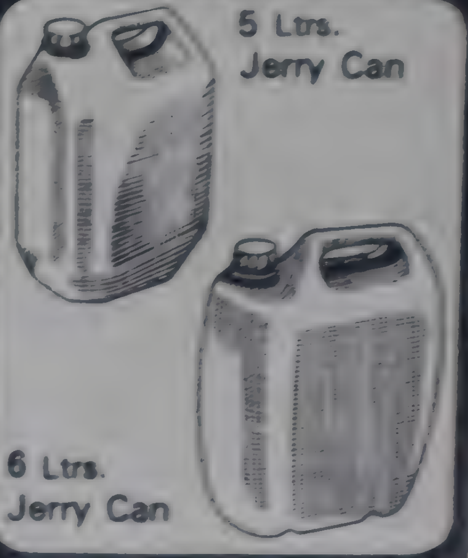
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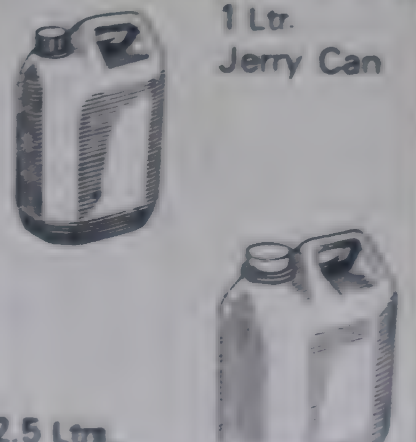
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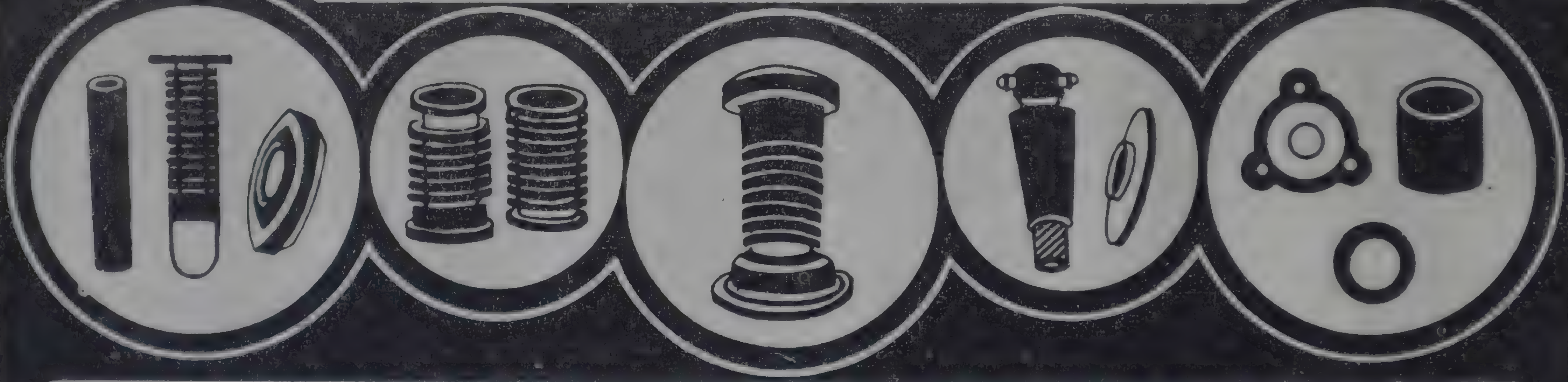

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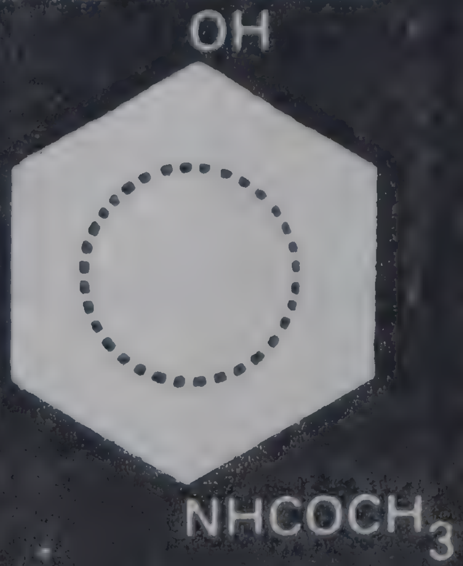

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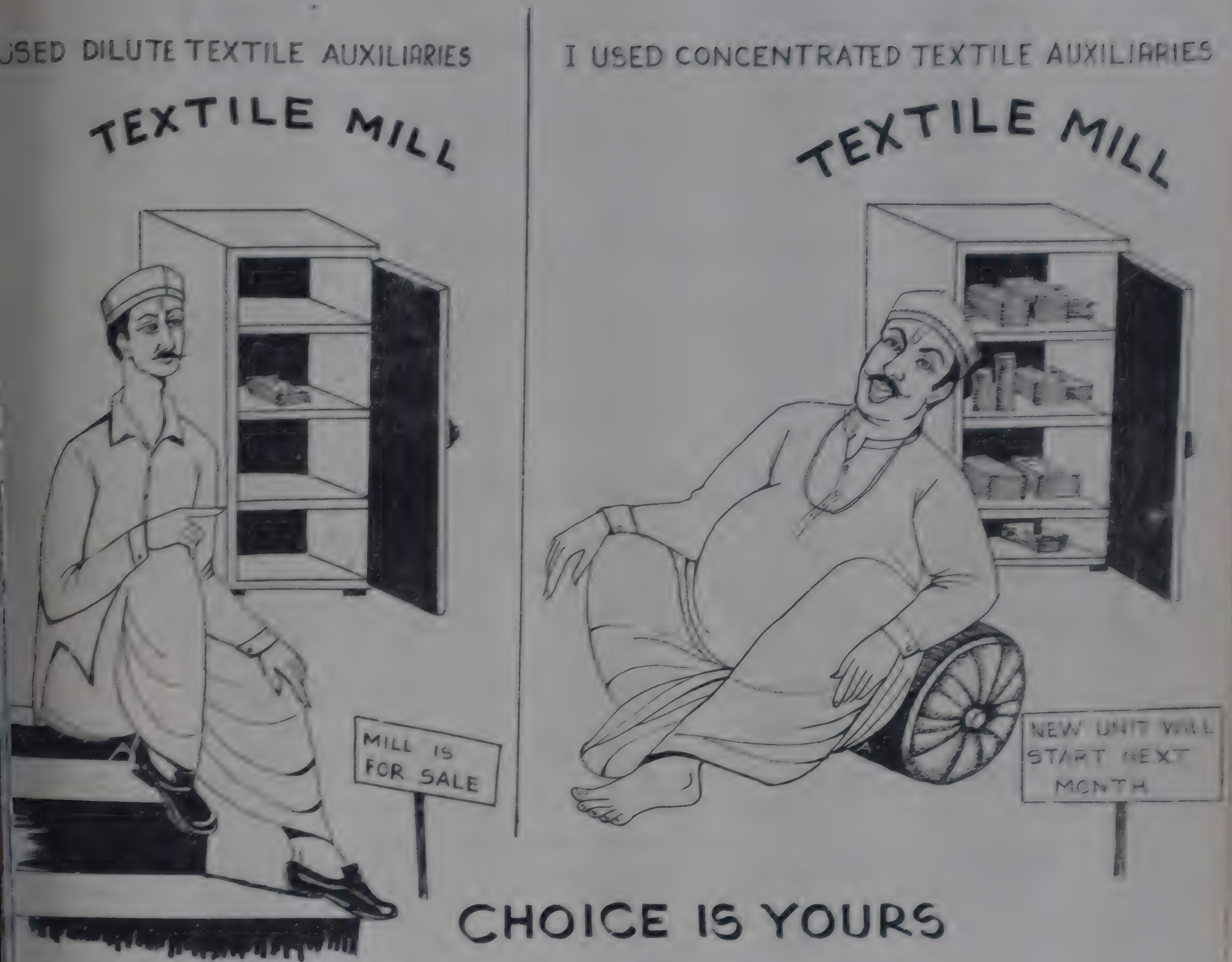
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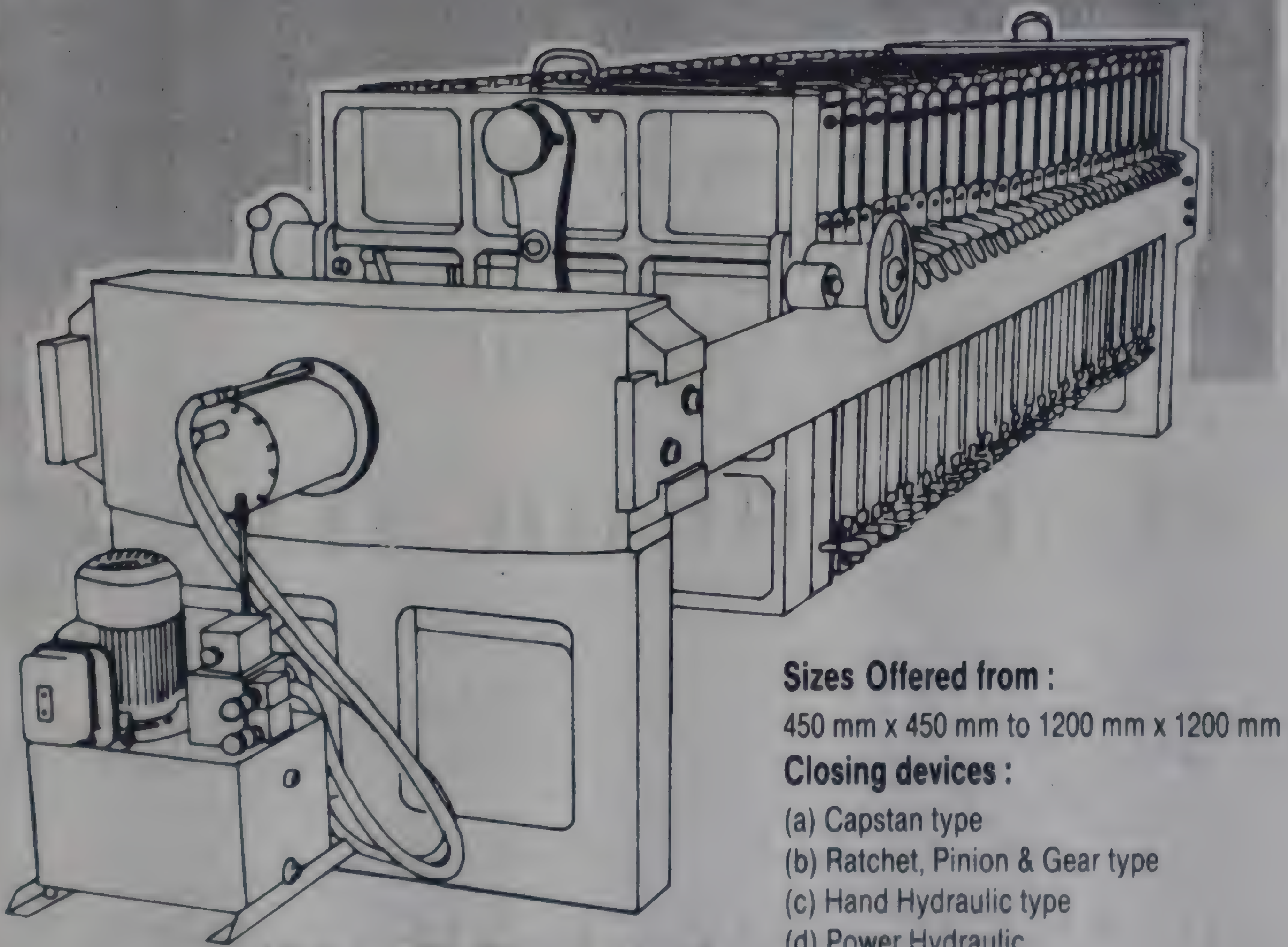

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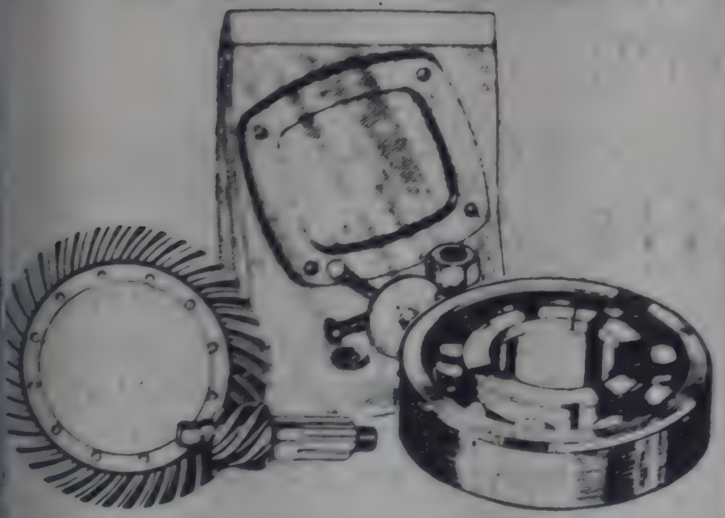

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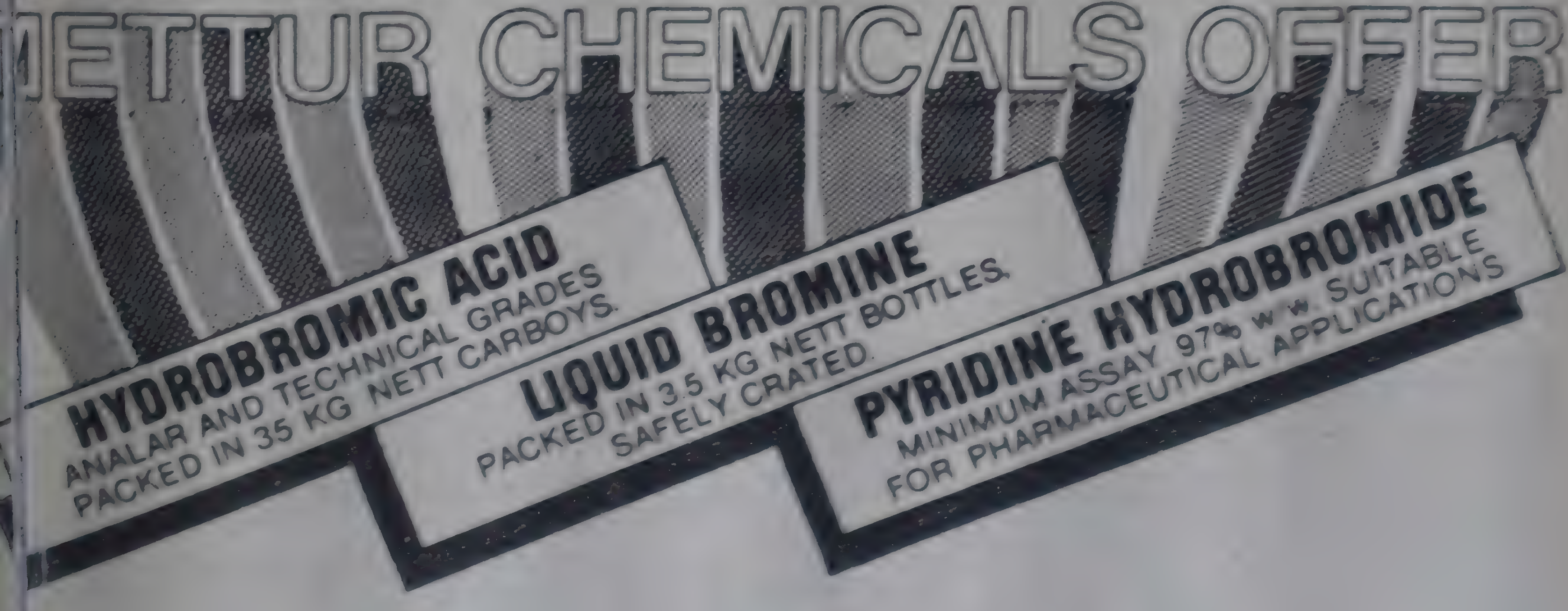

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VOL. XXXIII AUGUST 30, 1988 No. 51

Antartica -- The Continent under Siege?

Antartica has remained an object of scientific curiosity for centuries. Its vastness, geophysical isolation and climatic peculiarities offer unique opportunities in the pursuit of science. An exclusive natural phenomenon of ice cover differentiates Antartica from other continents. Practically, the entire area is covered by a massive ice sheet of more than 2000 meters in thickness. The close relationship between this titanic glacier, the atmosphere, the ocean and the continential thrust as well as the proven existence of large mineral wealth make Antartica an-area of great future hope.

Antartica has been described as a pulsating continent and also a white cold desert. It is best described as a treeless, riverless, almost lifeless desert, windiest and highest continent which is the home of blizzards and the penguins.

India's Antartica research activities commenced in 1981, with the launching of first scientific expedition during 1981-82. The objective of the Indian Antartica programme has been to foster and promote scientific studies. India is the only developing Asian country to have established a permanent station in Antartica. China has set up its station in 1984-85 and acquired consultatic status in October 1985 along with Uruguay.

Till now seven annual expeditions have been successfully launched from India. The latest and Seventh Indian expedition to Antartica operating from the permanent Indian Station Dakshin Gangotri had set for itself lofty and specific goals.

During the Sixth expedition, the geological survey had undertaken the survey of a mountain range (Petermann Mastiff), which revealed interesting mineralisation and deposits of ilmenite cores with a purity of 93%. During the seventh expedition, the survey work has been extended to another 1000 sq. km. of the range.

Another objective was the extension of geophysical investigations to adjacent areas and to collect samples for a study of the geothermal, geochronological and paleomagnetic properties.

In the field of geomagnetism, investigations were continued in the physics of magnetospheric storms in Antartica. One Indian scientist walked through the winter last year to obtain continuous data for the Gangotri area. Besides continuing these observations, the Seventh expedition monitored optical, atmospheric high energy cosmic ray emissions.

Oceanography, naturally enough, claimed major attention. Exploration of the distribution, availability, variability of living organisms -- particularly krill, squid and fish claimed top priority. Biomass of krill, its growth rate, distribution pattern, migration and ecology came in for close scrutiny. Physical and chemical characteristics of the Antartica ocean by-themselves offer a vast scope for intensive study.

During the Sixth expedition a major initiative had been taken in the study of blue green algae, existing in the ice free area of specific mountain range for e.g. Shirmacher and Wohltabl. Preliminary investigations revealed that about 80% of the samples collected were "no-fixing" blue green algae. The Seventh expedition, apart from further pursuing these studies explored the mechanism of the release of fixed nitrogen in the immediate surroundings. This will help to examine the influence on the growth of non-nitrogen fixing bacteria. An underwater survey of Priyadarshni lake (MAITRI) revealed the presence of thick algal mat consisting mainly of unicellural chlorophyceans. The investigations are likely to unravel the interrelation of blue green algae and other living forms thereby unravelling one of the fundamental mysteries of nature.

Studies on evolution, coal acclamatisation mechanism, physiology of energy fluxes, food chain dynamics and biomass production in glacial, limentic oasis and littoral ecosystems of Antartica will all come in for intensive probe.

The Antartica polar climate is the most rigorous in the world; factors of diverse order contribute to it emphasising the features of uncertainty, cold and extreme dryness. Low temperature caused by the frequent high winds interacting with the ice sheet create the most inhospitable landscape that one could possible imagine. The vagories of the Antartica climate are still a challenge to the weathermen.

The dramatic depletion of ozone layer in Antartica reported in 1985 has aroused intense concern regarding the future co sequence to the global environment. A permanent geomagnetic laboratory has been set up at Dakshin Gangotri for conducting year-round studies, which include continuous monitoring of magnetic fields fluctuations. Five ozone sonde ascents were successfully taken during January-February 1987, besides the continuous recording of surface ozone content.

The Seventh expedition initiated the construction of a new station with associated series. The installation of these permanent facilities have given a fillip to the utilization of wind and solar energy.

A twelve bladed horizontal axis wind generator was assembled and commissioned and the performance evaluated in the vicinity of the MAITRI field camp in Antartica. Testing was done from 26th January 1987 to February 1987. A maximum output of about 1.5 Kw at a wind speed of 28 knots from the south-east direction was recorded.

Two solar photovoltaic models in series were installed on the north facing roof top of the MAITRI camp with connections for the battery bank for charging. The two solar photovoltaic models left behind at Dakshin Gangotri station were monitored. The installation was found to be quite intact and the performance of the module satisfactory.

The sun shines as much on Antartica as it does on the equator. Yet for four months each year, there is perpetual darkness. In Antartica the ecosystem is so fragile, it can taken 10 years for a footprint in the moss to disappear.

By all means, Antartica called a 'Super Continent' by Dr. Arun Paulekar who led the largest Indian expedition, is a treasure trove of limitless natural resources. Seas surrounding Antartica teem with biological bounty particularly dominated by krill, a shrimp like crustacean rich in protein. As researchers see it, krill has the potential to become one of the world's major fisheries. It is estimated that about 40-50 million tonnes of krill can be harvested from Antartica seas.

Further, it is expected that about 50 mineral deposits can be located in the ice free area of the continent. In 1985, the German research vessel 'Polar Stern' found "unambigous evidence of active petroleum sources" near the northern tip of Antartica. And the USA on its part has estimated that offshore oil reserves of Antartica must run into tens of billions of barrels.

Researchers are also confident of unearthing unlimited quantities of coal from beneath the icy crust of Antartica. What's more, Antartica's ice cap contains 70% of the world store of fresh water, pointing out to the possibility of towing iceberg to produce fresh water in dry areas.

The immediate threat to Antartica's ecosystem stems from the intensive krill fishing resorted to by countries like the USSR and Japan. Since krill supports all the higher species in the marine food chain of Antartica, depletion of krill stock is fraught with perilous consequences for the marine organisms of the [illegible] the major food source of five whale species. three species of seal and 23 species of fish and squid many birds.

Continuous krill fishing can disturb the eco-condition region and many species here are highly vulnerable to c ditions different from those in which they have been evol Ecologists are worried that disappearance of krill can sp disaster for a variety of bird and fish species in the region. the vast, undisturbed wildlife reserve that Antartica is, can become a graveyard of many rare marine organisms.

Another possible danger to the eco-stability of Anta comes from the possibility of industrially advanced nat taking to oil drilling in the region. For since more than a dec now, offshore seismic surveys have been carried out Norway, West Germany, the Soviet Union, France, Austr Japan and the United States. The severe cold, strong w and moving ice-bergs can lead to accidents of massive m nitude during the drilling.

Moreover, oil spills can harm the extensive breeding onies of penguins and seals and even affect the polar ice c exerting a disturbing impact on the global climate and sea le

Antartica is crucial to sustaining the biological product in the Indian Ocean, besides maintaining the global sea l and overall climate the world over. Air circulation pattern, t perature fluctuations and solar radiation in other parts of world is directly affected by the rate of snow melting in An ica. Antartica thus serves as a great natural lab, contai a wealth of information about the planet earth.

Interestingly the ice crust of Antartica can provide a p to the level of chemical pollution affecting the world in t Researchers in Antartica have been able to acquire an ins into the global levels of DDT pollution and the way it is tra ported from the analysis of the ice sheets of Antartica. S ilarly, Antartica provides a special situation for monitoring changes in the global atmopshere, triggered off by the f tuations in carbon dioxide level. Further, the clarity of An ica's atmosphere has been of considerable significanc studying the extent of ozone depletion. As it is, ozone l serves as a protective shield of earth by shutting off the e of dangerous ultra violet rays. Research done from Anta has indicated a dramatic fall in the global ozone layer du increased chemical pollution. Today this coldest and win continent, mostly bereft of life, is under seige.

Fired with greed for space and resources, man is lea no stone unturned to exploit the vast treasure trove of res ces hidden beneath the icy crust of Antartica. Not conten laying waste the inhabitable part of the globe, man is n set to pollute the pristine pure environment of Antartica name of scientific exploration.

Certainly, it is high time Antartica is freed from too of human interference to maintain its vital importance t rest of the world as a natural laboratory par excellence

– T.P.S. RA

HEMARENA

.. VENKITESWARAN

Antimalarials

rtemisa annua also known as *quinghao,* is a herb d in China for over 2000 years to combat malarial r. Research on its active constituents has been g on in some countries including India but US has e ahead and developed a derivative which is claimed e more effective. Clinical trials are under way. Chi e researchers had isolated the active principle -- misin or Quinghaosu QHS which is a novel sequi ene lactone with a peroxy group. Catalytic hydro ation has given an epoxide without antimalarial ity but when reduced with borohydride the lactone p becomes a lactol termed dihydro artemisinin iS which is more active. The WHO has taken inter the work and in 1985 the ethyl ether of DQHS has developed and the alpha and beta forms separated. The ß-ether called "artether" is being promoted for treatment of high risk cases including cerebral malaria.

Malaria is the Number One infectious disease with about 210 million cases per year by the *plasmodium faleiparum.* The control of mosquitoes has not been effective over a long period due to resistance development to drugs and no effective vaccine yet in sight. The view is that malaria will need a variety of drug types to supplement the present chloroquine, mefloquine and pyrazinamide and the new artether may be a good addition. But costs of treatment are not yet clear and this artether requires to be injected into a large muscle. It is to be hoped that the ongoing work in India will lead to better alternatives.

Homeopathy Creates a Sensation

hbrose Bierce called homeopathy the humorist of edical profession and the centenary of the founder eman was celebrated recently. Homeopathy has nued to be practised extensively and claims thou s of adherents who swear by the sugar-coated pills are said to contain micro or ultra-micro quantities ive remedial salts. Now that molecular biology has ed great heights and the action of biochemicals molecular level are analysed and explained, one perhaps explain the effects and way of action of ltra-micro dosage of some of the homeopathic eas. But it is now reported that even a molecule e ingredient is not required and that water retains age or memory" of the absent medicament mol and be effective. What is more, this claim which tional and unbelievable is published in the most ritative and prestigious science journal, *Nature* of n, even if *Lancet* would not have looked at it.

sensational research paper is by Jacques Ben of France's National Institute of Health and Med esearch (INSERM) and a dozen co-workers there Israel, Italy and Canada -- an international effort. oup used a simple test that detects whether a cer pe of white blood cell has been simulated by an antibody to the cell's surface protein. When stimulated, the cell can no longer be stained and visualised under the microscope. It was found that antibody concentration of 10^{-120} Mole and even lower could evoke this biological response. But if you compute the number of molecules present there can be only one at 10^{-14}M dilution and the antibody cannot even be detected at 10^{-9}M level. The effect was seen only in agitated "solution" of this dilution of a non-existent molecule. Heating, freezing or ultrasonification, suppressed the activity at this dilution but not of more concentrated ones. The speculation if not a conclusion is that of a molecular reorganisation of water. The findings were first reported to the paper two years back and the incredulous referees got repetitions done in five other laboratories around the world. The research work has leaked out to the press and excited the homeopaths who claim extremely small doses of certain drugs effect cures but Nature's editor suggests "wait and see" attitude before the belief in non-existent drug molecules.

The antibody has obviously retained its biological effect even in such dilutions at which no molecule could be present and perhaps it left an imprint on the water to take over. The results strike at the roots of two centuries of observation and rationalisation of physical phenomena. "Nature" hopes that its readers may think of explanations of this result. We talk of a fifth sense or sixth sense and telepathy and the effects of planets from

millions of miles across totally empty space. (
expect some similar work with air instead of w
show the remarkable behaviour of non-existe
ulant molecules or unseen hands in action.

Algae for Motor Fuels

Department of Energy's Solary Energy Research Institute (SERI) at Golden, Colorado, USA claims to have developed cultures of microalgae and their conversion to liquid fuels. Work on this subject has continued in spite of serious cuts in the grants and has now reached a positive phase. Microalgae are single celled primitive plant types of 1 to 200 micrometers but they double their mass 3 to 5 times in a day. In ponds under proper conditions 12.5 kgm. can be produced per square meter per year and they can be cultivated in saline water as well. More important is that the cells can hold 70% of their mass as lipids which can be converted to diesel and motor fuels. The research work has screened over 3000 strains and selected 10 to 25 strains. Chaetoceros and Navicula strains showed most promise, tolerating temperatures of 10 to 35°C and salinity of 10 to 85 millimhos/cu.m. Growth rates of 35 gm/m/day have been achieved with 66% content of lipids in laboratory and 40% outdoors. It is said that after a growth phase the cells are transferred to a second medium where reduced

nitrogen and silica leads to lipid accumulation. Th
are triglycerides as well as phospho and glycolip
some hydrocarbons are also formed. The ne
would be to genetically alter the selected str
higher growth rates. For scale-up, an open pond
is being constructed in an area where 5000
day of sunlight is available. The pond is of earthe
of clay and crushed rock into a liner of chlorina
yethylene. The scale up is being undertaken b
bial products of Fairfield, Calif. The problem o
dioxide supply has to be tackled and then the
ing which accounts for 25% of the cost. Suita
culants comprising cationic polymers are use

The lipids contain 10% oxygen which need
removed to get the useful hydrocarbon fuels a
lite catalysts are said to be promising. But com
success is some way off from the speculation o
algae supplying 150 to 400 bbl of liquid fuel p
per year at perhaps $ 1.60 to 2.00 per US g

Hydrogen Peroxide

We had referred (See ***CHEMICAL WEEKLY,*** June 21, 1988, p. 35) earlier to the new process developed by Du Pont of USA for making hydrogen peroxide directly from hydrogen and oxygen. The Patent 4,681,751 granted for this proces gives some details though rather limited. The most attractive features and claims are the absence of any organic component and therefore no risks of explosion and the much higher content of hydrogen peroxide in the reacted solution with reduced costs of recovery. The catalyst is palladium on adsorbent carbon which is prepared by contacting the powdered carbon at room temperature for five minutes with a solution prepared from 1 mgm. of $PdCl_2$ per gm. of 0.1 N HCl at a ratio of 6 mgm. carbon per gm of solution. The PD content is preferably above 0.5%. The ratio of Pd-carbon at 2% gives the best results. Adsorbent carbon grades like Alfa USP, Supelco, Carbosieve and others are suitable. The carbon can be prepared from sugars and cellulose in nitrogen by stages to 900-1000°C and activation afterwards. The process is carried out preferably at 0 to 25°C or lower if necessary. Pressures of 500 to 2500 psig. are preferred and higher

pressures yield higher concentration of produ
results were at 400 psig. and inlet ratio of O_2/H
Continuous operation is contemplated (and perh
ried out by now) at 1000 psig. with 50 psig. of
950 psig. of oxygen partial pressure, about 1
5% Pd/c per gm. of reaction mix, about 0.5 m ph
acid and -10 to +25°C with vigorous liquid-gases

In batch tests the aqueous acid/halide solu
prepared by dissolving 0.103 gm. of NaBr and 4
of H_2SO_4 in a litre of water and dilution to 2 li
reaction mix was prepared from 150 gm. of co
(Alfa) 5% pd/cand 35 ml. of the above acid ha
tion. The reaction was carried out in an autoc
a liner and outside cooling. The reaction mix w
duced after argon purge and stirred by impe
rpm. before introduction of the gas mix. About 1
tion of hydrogen peroxide was obtained. The
recovery procedure are not given and these m
important part of commercial know-how. It is
that this new process could be of importan
future.

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Benzene shortage hits chemicals exports

The chemical industry defaulted over Rs. 20 crores worth of export commitments in recent months because of non-availability of benzene, according to industry sources at Bombay.

Three Vapi-based units (Chemical Organics, Nascent Chemicals and Chemiesynth) with export orders to the tune of Rs. 40 to 50 lakhs a month have been starved of benzene for the last one-and-a-half months. Against a requirement of 500 tonnes per month, these units received only 30 tonnes during the last 45 days.

These and a host of other small-scale units also supply dye intermediates to large firms like Atul, Atic and Sandoz, which goes into finished export goods. The total loss would easily exceed Rs. 20 crores, according to industry estimates.

Small-scale units, who have been lifting benzene from the refineries for years, complain that the requirements of the two big LAB producers (Reliance Industries and Tamilnadu Petroproducts) have taken precedence over theirs. Together the two LAB giants consume around 4,000 tonnes of benzene every month.

Ironically, the bulk of benzene is being diverted into this nonpriority industry, which is currently facing a glut. Refineries have expressed their inability to reduce supplies to LAB units because of contractual obligations.

"This is unfortunate because refineries had spurned our offers to enter into contracts in the past because we are not big consumers," a small-scale manufacturer said. "When they entered into contracts with LAB units, they should have anticipated the current scarcity of the material," he said.

It is true that RIL and TPL have invested crores of rupees in their plants, he said. "But a 10 to 15 per cent cut in their supplies would not seriously affect them. It would have served our needs and helped fulfil our export commitments," a Gujarat-based manufacturer said.

At stake is not merely few crores of rupees worth exports but India's reputation as a reliable supplier. India is rated higher than China in fulfilling its commitments. More significantly, this is the golden era of export of dyes and dye intermediates. China is no longer dumping goods and western countries are opting out what they regard as low-tech, polluting industry.

Plant shut downs and temporary shortages are part of the chemical industry scenario. What is worrying chemical units is the distribution policy which ensures priority supply to a few units at the cost of the many.

A case in point is concentrated nitric acid (CNA) another item in short supply. The major producer is Rashtriya Chemicals and Fertilizers (RCF), which produces around 1,500 tonnes a month. Out of this, as much as 900 tonnes is reserved for various priority sectors like Defence Ministry units (for the manufacture of explosives) and public sector units like Hindustan Organic Chemicals Ltd. (HOC) and Indian Petrochemicals Corporation Ltd. (IPCL). "This is okay when the going is good but when there is a shortfall in production, the priority units gets the same amount and we are left in the lurch," a consumer lamented.

HOC, he said, produces about 1,800 tonnes of CNA a month and gets 200 tonnes from RCF of priority basis, which is only ten per cent of its total requirement. Diversion of these 200 tonnes to chemical units could save lakhs of rupees worth of exports without crippling HOC, he pointed out.

(See also p. 44)

HIGHER PRICE WON'T HIT DMT SALE: WADIA

Bombay Dyeing does not visualise any problems in marketing its DMT at the revised higher price of Rs. 27,000 per tonne as compared to Rs. 21,000, prevailing till recently.

Company chairman Nusli Wadia, while presiding over the annual general meeting of the company, at Bombay on 22nd August, stated: "Our DMT is only Rs. 500 per tonne higher than the PTA price and there is no problem of selling the material. Rather we are booked till the end of the current financial year."

The company is going ahead with the expansion of its DMT plant from 60,000 to one lakh tonnes and ready signed an agreement wit Troisdorf for technical collab The expansion would be co within two years of receiving ment approval for the foreign co tion. "This Rs 75-crore ex would be financed through inte sources and foreign exchange Mr. Wadia added. The new tec will also help in reducing raw and energy consumption in the DMT plant also, it was stated.

During the first four months current financial year (Ap DMT production was 9 per cen at 21,264 tonnes as compare 19,575 tonnes for the corres period last year. Sales were per cent at Rs 45.92 crores to Rs. 43.81 crores during the period.

The company's total turnove the first four months of the year was Rs 110.25 crores, a 13 per cent increase over R crores for the corresponding last year. The production in the division was up by only 6 pe during the same period, while were higher by 19 per cent at R crores, against Rs 53.92 crores corresponding period last year

The profit margin in the DM sion during first five months current year has been squeeze to higher paraxylene cost. H the "profitability has been res prebudget levels with the hike 6,000 per tonne in DMT's price," Mr Wadia said. "This bring in additional revenue of Rs 3 crores per month and next 7 months are expected to good as last year," he added.

Bombay Dyeing is the bigge due to the hike in import duty raxylene, as all other DMT PTA facturers have their captive the manufacture of paraxyle Wadia said. The company had as early as 1989 to be allo manufacture paraxylene. How was informed that "it is rese the public sector and that Bh roleum at Trombay would ma it. The proposal for this is s consideration after 8 years ha sed, he added. (See p. 56 fo news)

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Inputs shortage cripple auxiliary industry

Severe shortage of important raw materials like ethylene oxide, butyl acrylate etc. have brought the Indian Chemicals Auxiliary Industries to a standstill. Frequent shut down by the two manufacturers of ethylene oxide during the last eight months was the major reason for the crisis (vide CW dated 23rd August, 1988).

Addressing a Press Conference, Mr. S.K Parekh, President of the Indian Chemicals Auxiliaries Manufacturers Association last week, said that the Association was planning to meet the Government authorities concerned to sort out the problem.

Ethylene Oxida (EO) is a vital raw material required by about 70 EO Condensate Manufacturers who supply their products to atleast 2000 units manufacturing surface active and other products. The number of employees involved in these activities are about 20,000.

EO is manufactured at present only by National Organic Chemical Industries Limited (NOCIL) in Bombay and a public sector company Indian Petrochemicals Corporation Limited (IPCL) in Baroda.

EO is reacted with various chemicals which give rise to end products like textile process chemicals, oil additives for petroleum drilling, emulsifiers for pesticide industries, solvents for defence products, dyes as well as it is one of the vital raw materials in manufacture of brake fluids, medicinal, edible, cosmetic and pharma products.

Mr. M. D. Dhamankar, a leading lumiriary of the auxiliary industry, was of the opinion in view of good monsoon, offtake of pesticides would increase. Hence it was very essential the regular availability of EO should be made certain Pesticides Industry is using a number of auxiliaries made out of EO.

The Government had estimated the demand for this product to be around 20,000 tons for 1988-89 and it was hoped that the two manufacturers namely IPCL and NOCIL will make the same available to the industries. However, in the months of November and December, NOCIL had to take a shut down and IPCL had to take a shut down in the month of May and June. This has meant that 16½% of produc-

form of EO from these two suppliers. This means that there has been non-availability of about 3,000 tons of EO between April 1988 to now.

There have been serious explosions in large petrochemical complexes in U.S.A. and other large manufacturing countries. This has made a terrific impact on availability of Ethylene based products all over the world. As a result of this, MEG (Mono Ethylene Glycol — A Derivative of EO) has gone in tremendous short supply and the International prices, as offered to Indian buyers, have gone up from USD 650 per ton to USD 1,750 per ton. Few months back, there were no buyers for MEG manufactured by IPCL and NOCIL and the Government had to intervene in pressuring consumers of MEG to purchase their requirements from IPCL and NOCIL.

EO consumers are afraid that due to temporary world situation and shortage of MEG, the manufacturers of EO in India may divert their production of EO for making MEG, instead of supplying EO to consumers mentioned above. EO consumers make products which are a vital raw material for :

(a) Textile Exports which is today having a boom in the International Market and in case this industry is not supplied with EO Condensates, exports will be adversely affected.

(b) EO Condensates are used on a large scale in the manufacture of new quality of brake fluids which is safer than the earlier formulations and is on the line of the latest international standard for the same. One of the base materials was imported but now import substitution has been made on the hope of EO availability. If however shortage of EO continues it will bring an adverse effect in the success of import substitution.

(c) EO is a hazardous chemical with with a very low flash point and is not fit for importing and therefore the manufacturers have to depend only on local availability of EO. Therefore, though EO is under OGL Policy of the Government, the same cannot be imported in actual practice. MEG is

ted. MEG is also a large co
sumption item and even if part
the ethylene oxide is diverted
MEG, it will not make a sizeab
difference to the consumers
MEG whereas the effect of th
conversion will be a very seriou
problem for EO consumers ar
more than 20,000 employees w
face a threat of losing jobs. E
consumers are a majority sm
scale industry and the Goven
ment has invested a substant
fund amongst these groups
small scale industries. As it
there are tremendous problen
to small scale industries and no
availability of EO will mean
Death Knell to these small sca
industries.

(d) EO is a vital raw materi
amongst the manufacturers
Ethylene oxide Condensates, Et
anolamines, Glycol Ethers, D
Intermediates and Leather Ch
micals which are either impo
substitutes or thrust areas in t
export policies of our country.

The interest of EO consumers a
limited in requesting the manufacture
of EO to maintain levels of productio
to meet industries demand of abo
20,000 tons of EO and only the exce
availability of EO above this 20,0
tons be converted into MEG, as t
EO manufacturers are using norm
availability period as the referen
period for allocation of EO to actu
users, they should follow a simil
rule on MEG.

EXPORT OF LAB ALLOWED

The Union government has, for t
first time, decided to allow the exp
of linear alkyl benzene (LAB). Accor
ing to information available in Ne
Delhi, initial exports would come
about 50,000 tonnes valued at $40 m
lion.

A decision to this effect was tak
recently at a meeting which the secr
tary, petrochemicals, Mr. H. K. Kh
took with the producers' representa
ves. The immediate markets that h
been identified include China, Thaila
Singapore and Malaysia. Europe,
appears to be extremely promising
view of the competitive prices.

Of the 50,000 tonnes, the Tamil
du Petro-products and Reliance
will account for exports of 20,000
nes each. The balance will be expor

Butyl acrylate and 2 ethyl hexyl acrylate

Butyl Acrylate is a vital input for the anufacture of Synthetic Resins (Acryic Resins) which are used by the texile and leather industries in the manuacture of goods largely exported. Butyl Acrylate is required by about 100 Synthetic Resin manufacturers which nclude about 90 small scale units and 10 medium/DGTD Units who supply their products to various textile and leather industries. The number of employees involved in the manufacture of Synthetic Resins (Acrylic Resins) are about 25,000. Butyl Acrylate is not being produced in adequate quantities by the indigenous producers to meet the requirements of the cosmetic market which is 2300-2500 t.p.a. Yet it continues to be in App. 3 Part A of the current import policy and consequently very meagre imports can be made to supplement the small supplies produced domestically.

The principal manufacturer IPCL whese plant has been primarily installed to manufacture methyl acrylate required for their captive consumption, states that their plant capacity for all acrylates is 10,000 tpa. Going by past performance it would appear that IPCL's plant capacity is in effect less as only one acrylate is being produced at a time. Also the actual capacity depends on the product mix because the process time cycle differs for each product. Further, their acrylate plant has been having technical problems which has cut into the operating capacity of the plant.

IPCL Bombay, claim to have a capacity of 3000 t.p.a. to manufacture acrylates but in actual practice they mafacture more of ethyl acrylate and egligible quantities of Butyl Acrylate have been offered infrequently to actual users.

At present the fate of another acrylic Monomer namely 2 Ethyl Hexyl Acrylate is similar to Butyl Acrylate. Both the manufacturers are not supplying 2 Ethyl Hexyl Acrylate to various small sector industrial units who manufacture Synthetic Resin Adhesives. Apart from this due to explosion in the plant of a big U.S.A. manuacturer the supply position of Acrylic Monomers has become very difficult. become a rare commodi-

price quoted is totally unworkable. The Government therefore should exercise their authority to the producers of Acrylic Monomers to produce more quantities and supply the goods in sufficient quantities to all the consumers. IPCL could produce the entire requirement of Butyl Acrylate and 2 Ethyl Hexyl Acrylate without any problem if they are forced to manufacture.

If immediate action is not taken by the Government consumers of Butyl Acrylate and 2 Ethyl Hexyl Acrylate shall have no alternative but to close their units which will ulitimately affect 25,000 employees.

DGTD TURNS DOWN EO USERS' PLEA

The Director-General of Technical Development has declined ethylene oxide (EO) consumers' plea that Indian Petrochemicals Corporation Ltd. be directed not to divert more EO for producing monethylene glycol (MEG).

At a meeting held in Delhi recently a leading EO consumer said that according to his information, IPCL has decided to market only 550 tonnes of EO per month, against a capacity of 750 to 800 tonnes. IPCL proposed to convert the remaining EO into MEG, he said.

He wanted DGTD to advice IPCL to maintain its MEG output at the 1986 level when many MEG consumers preferred imports because it was cheaper. The DGTD official reportedly said that MEG was also an important raw material and his office did not want to interfere with the product mix decided upon by the company.

No IPCL representative was present at the meeting. A representative of National Organic Chemical Industries Ltd. (NOCIL), the only other EO manufacturer, said his company could produce a maximum of 850 tonnes a month. The company would continue to sell this quantity on the basis of each company's offtake in 1986-87, he said.

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Dr. O. P. KHARBANDA

Frankly Speaking

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A Damn Good Investment !

Nearly thirty years ago, I entered a life subscription for the Readers Digest paying $100, in the name of my son. Our entire family of four has read avidly the monthly issues of the Digest acclaimed to be the 'World's most read magazine'. In order to locate a particular article of interest that appeared "just the other month" (it always turned out to be much older than we thought) we used to 'browse through' (quite profitably) the entire collection. Later, we came to know of the annual index which was available, free of charge, against a specific request. This facilitated the search process considerably, although the random browsing had its own value including a nobel prize ! (See next FRANKLY SPEAKING).

We moved house from Calcutta to Bombay in the early 60's and thereafter, we had to shift house four times. Each move was preceeded by "spring cleaning with some hard decisions on whether to retain a particular item or not. In case of the Digest, the choice was clear and unanimous. It was always retained, with the result that until recently we had half a cupboard full of the back issues of the Digest. The collection was always easily accessible and it was a pleasure to pick up some old issues at random and find quite a bit of material very relevant at that particular time. As an author, before starting an article or a book on any particular subject in my field of Engineering-Finance-Management, I usually begin my search from the Digest index and always find some relevant material as a starter, nucleus sufficient to get the project 'off the ground' and rounds to the various libraries, depending on the particular subject in hand, would enable collection of more material.

Earlier I had thought of getting the back volumes bound but they can be bulky for convenient handling. So, why not cut out articles of intere the old issues of the Digest, including some regular features such as Life in These Uni tes, It Pays to Enrich Your Word Power etc material is now classified subjectwise e.g., nature, history, geography, personalities etc sing through a collection on one particular is like getting a quick 'refresher course' subject. This exercise has been most rewar generating new ideas for my future writing the real fun has only just begun!

Each of us has in every issue of the Digest items of direct relevance to our respective I am a Chemical Engineer and a consultan cost and management field. My wife, Su is a qualified teacher with particular interes tory and romance. Our daughter, Madhu, in catering, Hotel Management and Applie tion and used to manage a premier indust teen club. Her husband is also in the sa and is Manager (F & B) at the five star Leela Penta. Our son, Vivek, by whose we get to read the Digest is a Chartered tant (Certified) and runs a Computer Ce Bombay suburbs. Fortunately, his wife also fond of reading. There is another 'fa e.g., on my 2-3 weeks trips abroad or a sho in India. I take with me material on a couple jects for perusal.

The Digest has indeed proved to be one best investments, ever. It has been recove times over and with the technique descri the return has increased several fold. Th dends, of course, still continue to come ev th and we eagerly look forward to many m of pleasure, in reading and education. 'Treasure' will be bequeathed to our gra ren, the first one having just started s

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Benzene shortage: HOC Cochin unit 'shut down'

Hindustan Organic Chemicals Ltd, has been forced to suspend operations at its 40,000 TPA phenol plant in Cochin, the first major casualty of the acute benzene shortage now plaguing the chemical industry.

The plant requires around 1000 tonnes of benzene everyday. To run the plant at 70 per cent capacity, benzene requirement is around 70 tonnes. The plant cannot run below this capacity, it is understood. The bulk of the supplies are effected by Bharat Petroleum Corporation Ltd. A BPCL spokesman said the Corporation has been endeavouring to fulfill its commitments to the best of its ability.

HOC is hopeful of resuming operations by the month-end, when some 17,000 tonnes of imports, under the advance licensing scheme, is expected to arrive. Benzene is now quoted around $ 400-425 in the international market.

The virtual shut-down of the phenol plant was led to a scarcity of phenol. The worst affected is the plywood industry, the major consumer. Phenol prices, however, have not flared, industry sources said. HOC is the major producer, with 40,000 tonnes capacity, followed by Herdillia Chemicals with 20,000 tonnes.

The benzene shortage has also affected HOC's export commitments. The company has so far exported 3,000 tonnes of phenol and had planned to export 1,000 tonnes every month.

According to an industry source, the two lab units (Reliance Industries and Tamil Nadu Petroproducts Ltd), major benzene consumers, are relatively unaffected by the crisis. Both units are said to be holding around two months' inventory.

Unconfirmed reports say that the commissioning of Cochin Refineries' 87,000 TPA benzene plant, scheduled for early 1989, is likely to be delayed. Until this plant goes on stream, the industry will have to live with shortages, it is feared. The material is also said to be in short supply in the international market.

Industry sources say both Indian Oil Corporation and the State Trading Corporation are scouting for imports which the Government has okayed. Only an year ago, there was a surplus of benzene. The dramatic rise in consumption is attributed mainly to the commissioning of the two lab units, who between them consume more than 50,000 tonnes of benzene.

Benzene is quoted around Rs. 6,500 per tonne ex-factory. The major producers are Indian Oil Corporation, whose 20-year old Koyali plant produces 48,000 TPA and Bharat Petroleum Corporation Ltd, whose three-year-old plant in Bombay has a capacity of 98,000 TPA.

Other producers include Indian Petrochemicals Corporation Ltd (IPCL) which produces 35,000 TPA, about half of which goes for captive consumption. National Organic Chemical Industries Ltd (NOCIL) produces around 15,000 TPA and the various other steel plant produce around 26,000 tonnes as a by-product.

BENZENE BEING DIVERTED TO LAB UNITS

Many medium and small-scale units making dyes, dyes intermediates, pesticides and bulk drugs are totally denied of supplies of benzene, a building block for these industries, since last several weeks.

These medium and small-scale units have received virtually no supplies of benzene since this July. Many of these units had to drastically curtail their production and export plans.

Both Bharat Petroleum Corporation and Indian Oil Corporation, two large manufacturers of benzene, are reportedly diverting a substantial part of their production to manufacturers of linear alkyl benzene (LAB) and to other large users.

Almost 50 per cent of the current monthly production of 13,000 tonnes of benzene are consumed by the three LAB manufacturers.

Hindustan Organic Chemicals which uses benzene for the manufacture of dyes and dyes intermediates requires 2000 tonnes of benzene a month while Gujarat State Fertilizer Corporation requires 2000 tonnes of benzene for the manufacture of caprolactum.

Industry sources said the shr kage in the availability of benzene h arisen especially after the commissio ing of the LAB plants of Reliance i dustries and Tamil Nadu Petrochem cals early this year.

Two LAB units and other large u ers of benzene have contractual arra gements with both the oil compani for regular supplies of benzene. But such contracts have been executed be ween oil companies and most of th medium and small-scale units.

Meanwhile, the State Trading Co poration has been asked to import 14 000 tonnes of benzene in the conte of the current tight supply situation Out of this quantity 7,000 tonnes a expected to be imported very short

LAB STOCKS PILE UP

Linear alkyl benzene (LAB), a vi input for detergent manufacture has takers now.

The three manufacturers of LA Indian Petrochemicals Corporation L Reliance Industries and Tamil Na Petrochemicals have a combined sold stock of over 35,000 tonnes va ed at over Rs. 75 crores.

Only a few months ago, the St Trading Corporation had imported chemical on a large-scale as the mestic production by IPCL then inadequate to meet the total dema

According to informed sources, current monthly production of LAB the three units is placed at 13,000 nes whereas the monthly demand f the detergent industry is not more 10,000 tonnes.

With a monthly addition of at l 3,000 tonnes of LAB to the stocks no substantial increase in dema manufacturers may face a serious ventory problem in the months come.

Nirma still ranks the largest use LAB with a monthly consumption 6,000 tonnes followed by Hindu Lever at 2,000 tonnes.

Reliance has a capacity to pro 60,000 tonnes per annum, Tamil N Petro 50,000 tonnes, and IPCL 3 tonnes.

The sources point out that w surplus production of LAB now a the months to come, the govern should encourage the export of LA avoid stock accumulation.

A major hitch for the export o would be the high price as com

CMA proposals to boost chemicals export

he Indian Chemical Manufacturers
ociation (ICMA) has made certain
mmendations with a view to expan-
 the chemicals export base to Rs.
00 crores from the present Rs.
00 crores in line with Government
ctives.

CMA has suggested joint monitoring
the erratic raw materials supply
ition by the Government and indus-
 and the initiation of corrective
s through a flexible adjustment in
h compensatory support or making
ilable inputs at steady prices.

Further, it has recommended that
s available adequately in the
estic market should not be shifted
appendix 2B from appendix 3A as
 would affect manufacturers adver-
. However, the association agrees
he need for an immediate policy
ew on the subject.

CMA has also suggested the for-
on of a standing committee on
trade and tariff for a broad-based review of various sectoral representations made by different sectors of industry.

Speaking at a news conference in New Delhi recently the ICMA President, Mr. S.M. Datta, said chemicals export from India is suffering from three inherent drawbacks. The size of units are comparatively smaller than international limit, the cost of inputs tend to go higher and the cost of energy consumption works against the units.

ICMA has also listed several hindrances in the way of growth of the chemicals industry despite an average annual growth rate of 12 per cent during the last four years. Removal of these lacunae would facilitate an accelerated growth for the industry during the Eighth Plan period, according to the association.

In view of the recent liberalisation measures by the Government, ICMA has suggested that liberalisation should cover both the ID and R Act and the MRTP Act without exception and should be extended to the chemicals, petrochemicals and pesticides industry so as to provide the necessary impetus for growth. So far, the Government had been issuing notices granting exemptions under the ID and R Act or the MRTP Act as measures of liberalisation, the association has said.

It has further suggested that locational constraints should also not be made applicable to capacity re-endorsement, automatic growth and broad-banding provisions. According to a recent clarification, the same is not applicable to units expanding to minimum economic size of operations.

Also broad-banding of chemicals should be extended to dyes and dyestuff intermediates and a dialogue should be inititated between DGTD and ICMA in this regard.

These apart, ICMA has suggested that industrial licences should make adequate provisions for chemicals by-products within broadly defined specifications.

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Fertiliser order amended

The Union Government has amended the Fertiliser (Control) Order of 198 by issuing a new order to be called the Fertiliser (Control) (Third Amendment) Order of 1988. The order brings under its purview micronutrient fertilisers.

The order has now redefined fertilisers, which now means any substance used or intended to be used as a fertiliser of the soil and or crop and specified in Part-A of Schedule-I of the order and includes a mixture of fertilisers, mixture of micro-nutrient fertilisers and special mixture of fertilisers.

According to the order, mixture of micro-nutrient fertilisers would mean a mixture of two or more micro-nutrient fertilisers. Similarly, "grade" under the order would mean the nutrient contents in the fertiliser expressed in percentage.

The order now stipulates that a State Government may by a notification in the official Gazette and on such terms and conditions as may be specified in such notifications, constitute a committee called the State fertiliser committee to advise it regarding the grades and formulations of mixture of micro-nutrient fertilisers and their specifications.

Such committees would consist of a chairman and not more than five other members, having experience or knowledge in the field, including a representative from the State Agricultural University, the fertiliser industry and the Indian Micro-fertilisers Manufacturers' Association.

The amended order also stipulates that subject to other provisions, no person shall be allowed to manufacture any mixture of fertilisers unless such mixture conforms to the standards set out in the notification to be issued by the Union Government in the official Gazette.

Similarly, no person shall manufacture any mixture of micro-nutrient fertilisers unless such mixture conforms to the standards set out in the notification to be issued by the State Government in the official Gazette.

According to the amended order, existing units already manufacturing mixtures of micro-nutrient fertilisers for which standards have not yet been specified, may continue to manufa
sale, sell, offer for sale, exhi
bit for sale or distribute such
of micro-nutrient fertilisers
year from the date of the
(July 28, 1988) or till the
are prescribed by the State
ment, whichever is earlier.

This is subject to the
that before the expiry of the
period, the units will follow
dard prescribed by the State
ment and certificate of ma
under clause 15 of the order

It is also stipulated that
tificate of manufacturer shall
led in respect of any mixture
lisers or mixture of micronu
tilisers which does not c
the standards set out in the
tion.

By another amendment t
tiliser (Control) Order of 19
Government has prescribed
tions for nitrophosphates. E
fications have been stipulate
gard to moisture percentage,
rogen percentage, percentage
gen in ammoniacal form, per
nitrogen in nitrate form, per
neutral ammonium nitrate,
phosphate, percentage of wa
phosphate, calcium nitrate
and particle size of the mat

The Fertiliser (Control) O
issued on September 25, 19
quently, five amendments
brought about on February
October 21, 1986, Septemb
87, December 11, 1987 and
1988. The present amendm
the sixth in the last three y

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HFC PLANTS' REVAMP TO ADDITIONAL RS. 986 CRO

The Union Government w
invest an additional amount
986 crores on four plants
tan Fertiliser Corporation
these are to be rehabilitated

The plants in question
erating units at Namrup, F
Durgapur and the Haldia
is lying closed since Octob
lowing a Government dire
amount required to be inv
vamping these units has b
timated by the foreign
which were appointed by t
ment to assess and formu
lage for the ailing plants

...ernment has not yet taken
...on on the recommendation
...s received only a couple of
... But sources here say
...overnment would be in a big
...as to whether to work out an
... Rs. 988 crores for investing
...nits, which is one of the top
...making public sector units in
...y with a workforce of over

...ports of Toyo Engineering
...n of Japan and Udhe Gmbh,
...many, have proposed that the
...tiliser project can be rehab-
...commissioned with an addi-
...estment of about Rs. 500
...he proposal envisages that
...ilitation, the ammonia plant
...e at 80 per cent capacity
... urea and methanol plants
... cent capacity utilisation
...nd acid group of plants (ex-
...e soda ash plant) at full ca-

...sultants have suggested a
...ckage for operating HFC
...amrup, Barauni and Durga-
...package envisages that the
...d be revamped in three pri-
...ges so that only minimum
...duction is incurred. The re-
... cost is estimated at Rs.
...res.

...g to the consultants, the
... be achieving their individual
...ities after they are rehabili-
...r the suggested plan.

...h a paid-up capital of about
...ores, produced fertilisers
... 153.74 crores in 1986-87
... Rs. 149.81 crores in
...s losses in 1986-87 were
... Rs. 86.22 crores against
...crores in the previous year.

...r at Haldia was mechani-
...eted in 1979 but it could
...ence commercial produc-
...nt of a variety of reasons
... 1986. The plant was on
...ns and production of 8,655
...mmonia, 1,905 tonnes of
... 3,889 tonnes of urea and
...s of nitrogen was achieved.

... problems faced by the Hal-
...ere the inconsistency and
...akdown in oxygen compres-
...es from the reversible ex-
... air separation plant, ammo-
... condenser leakage
... interruptions. Maintenance work was taken up in August-September 1986 and subsequently the plant could not be restarted for trial operations in view of the directive from the Government in October 1986 to stop the commissioning activities.

However, special permission was obtained for carrying out limited trials on nitro-phosphate plant to establish the feasibility of the sulphate recycle process for nitro-phosphate production. In January 1987 the trial runs were carried out successfully on a small-scale, thereby, establishing that the process was prima facie workable.

Meanwhile, the Government decided to appoint foreign consultants to carry out an end-to-end survey and to submit the report for taking investment decisions to rehabilitate the project. The investment requirement of Rs. 500 crores is arrived at by these very consultants.

The licensed capacities of the Haldia project are: 1.65 lakh tonnes of urea, 2.52 lakh tonnes of NPK, 1.99 lakh tonnes of NP, 41,250 tonnes of methanol, 82,500 tonnes of sulphuric acid, 1.99 lakh tonnes of nitric acid 33,000 tonnes of phosphoric acid and 1.32 lakh tonnes of ammonium sulphate.

Even the two units of HFC's Namrup plant, the unit at Barauni and the one at Durgapur have been facing production constraints as a result of which their capacity utilisation has remained poor at 48 per cent, 40 per cent and 33 per cent respectively in 1986-87 compared to 38 per cent, 61 per cent and 30 per cent in the previous year.

The Namrup units, which produce ammonium sulphate, urea, sulphuric acid and ammonia, have been facing problems on account of the following factors: Diversion of ammonia from the first unit to the second unit, frequent fluctuations in natural gas pressure from suppliers end, power interruptions and equipment break-down in ammonia, sulphuric acid, ammonium sulphate and urea plants.

In view of all these factors, the consultants have suggested a major revamping of these plants so that these could achieve their rated capacities.

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Panel to monitor industrial exports in 8th plan

e Government has set up a high- l steering committee for planning strial exports during the Eighth n (1990-95) under the chairmanship Dr. A. S. Ganguly of Hindustan er.

he 20-member committee comprises esentatives from diverse sections the industry, bureaucracy, banks, ort-import houses, marketing bodies universities. The group is to sub- its report to the Government by ember 31.

mongst the committee's major s will be the assessment of the im- ance of manufactured and process- goods in accelerating industrial wth and to suggest measures for in- ating export planning with indus- planning.

he panel will further review the ormance of manufactured and pro- ed goods export and identify key rt items alongwith reasons for predominance.

will also identify hindrances in way of higher growth in existing rt items alongwith reasons for come them.

e panel will also evolve a strate- for a qualitative expansion in the rt of manufactured goods so that export of manufactured and pro- ed goods constitute 10 per cent of ross national product by the end e Eighth Plan.

is may include considerations on es in the prevailing fiscal and policy framework, means to achi- echnology and quality upgradation port products, identification of ets with the greatest potential for rt growth, changes in the adminis- e structure governing exports and strial location policy affecting ex-

e panel will further identify major tment and necessary infrastructure port promotion and consider ways by which the State Governments may take appropriate measures for export promotion as an integral part of their industrial planning.

The working group has been empowered to co-opt any such official or non-official as member(s) as it may deem necessary.

Besides Dr. Ganguly, who is the Chairman of Hindustan Lever Ltd, the other members of the group are; Dr. P. C. Joshi, adviser (international economics), Planning Commission, Mr. A. V. Ganesan, Additional Secretary, Department of Industrial Development, Mr. P.G. Muralidharan, Additional Secretary, Ministry of Commerce, Mr. R. C. Chopra, Additional Director, Department of Electronics, Mr. Surindra Singh, Principal Secretary (Industry) UP, Mr. K. Mohan Chandran, Secretary (Industry), Kerala, The Chairman, Export-Import Bank of India, Mr. S.S. Dawra, Managing Director, National Agricultural Co-ooerative Federation of India Ltd., Prof. Deepak Nayyar, Jawaharlal Nehru University, Mr. Tarun Das, Director-General Confederation of Engineering Industry (CEI), Mr. K. Obayya, Executive Director, Trade Development Authority, Mr. H.S. Sandhu, Chairman-cum-Managing Director, Chinar Exports, Mr. Binay Kumar, Chairman, Banaras House Ltd., the Chairman, Tata Exports, Mr. B.M. Munjal, chairman, Hero Motors, Mr. G.H. Shah, president, Bharat Chambers of Commerce, the President, Federation of Indian Export Organisations, Mr. A.R. Matoo, carpet manufacturer and exporter, and Dr. Rakeshmohan, Economic Adviser, Planning Commission.

PLANT PROTECTION CHEMICALS : 'ECOSYSTEM POLLUTED'

Kerala's minister for agriculture V.V. Raghavan said that "unscientific usage of plant protection chemicals had polluted not only the vegetables but also the ecosystem."

Inaugurating the three-day 10th workshop on vegetable research, spor sored by the Indian Council of Agricu tural Research (ICAR) at nearby Ve lanikkara agricultural university cam pus, the minister called upon the scien tists to find out effective ways an means to reduce the residual toxicit of many insecticides presently being used by the farmers.

He said the government had taken effective steps to augment the production of vegetables by increasing the area, using high yielding varieties and making the requisite inputs available to the farmers. About 300 scientists from all over the country are attending the workshop.

Speaking on the occasions, deputy director general of ICAR, Dr. K.L. Chadha, said India was the second largest producer of vegetables in the world with a total annual production of 45 million tonnes in an area of four million hectares.

The minimum requirement of vegetables in the country would be about 104 million tonnes by 2000 AD for an expected population of 950 million, he added.

He said the ICAR's all-India co-ordinated project had made many strides during the last 18 years. It had identified 92 new varieties of vegetables and standardised about 40 schedules for control of diseases and pests.

Mr. Chadha said that out of three lakh tonnes of vegetables consumed in the state annually, 1.5 lakh tonnes were being brought from the neighbouring states.

At present the per capita consumption of vegetables among Keralites was 30 grams a day as against the optimum requirement of 280 grams, he said.

The total requirement of vegetables in the state would be 31.1 lakh tonnes by 2000 AD and to achieve this an area of 1.55 lakh hectares had to be brought under vegetable cultivation.

A national research centre on onion and garlic would be established shortly, he said.

FINE CHEMICALS & DRUGS

Four more bulk drugs under price control

The Union Government is bringing bulk drugs used for four more national health programmes under price control. The Drugs Price Control Order of 1987 covered only bulk drugs used for seven programmes.

According to official sources, the Government is also planning for re-categorisation of some major bulk drugs.

The Ministry for Health and Family Welfare has already sent its list of bulk drugs, which need to be covered under DPCO 1987 to the Department of Chemicals and Petrochemicals in the Industry Ministry, which is the administrative agency for implementation of the price control order.

The department has also referred all the recommended bulk drugs to the Dr. Vijay Kelkar Committee.

Once the Committee completes its work, the Government would amended DPCO, 1987 to give effect to the reclassification of the drugs concerned. DPCO, 1987 has empowered the department to periodically review the list of price-controlled drugs and modify it.

The order included 27 bulk drugs used for six national health programmes under Category-I, as per which the the maximum allowable post manufacturing expenses (MAPE) was fixed at 75 per cent.

Some bulk drugs needed for national family welfare programme including mother and child health, were also brought under the price control, but were classified under Category-II, as per which MAPE was fixed at 100 per cent.

The four national health programmes, to be covered under the enlarged DPCO, 1987, are sexually transmitted disease (STD) control programme, universal programme on immunisation, national aids control programme and the national goitre control programme.

The recommended drugs for these programmes are now being evaluated by the committee for inclusion in Category-I of DPCO, 1987. The criterion for inclusion in category-I is that the bulk drugs have to be used for health programmes.

Similarly, drugs commonly used for the maternal and child health programme (Vitamin-A, iron and folic acid) are being shifted from Category-II to category-I. Sera and Vaccines required under the immunisation programme has also been recommended for inclusion under Category-I.

The Health Ministry has also recommended that paracetamol should be removed from Category-I. Also proposed are re-categorisation of rifampicin (now under Category-I) and exclusion of diazepam and other tranquilisers from Category-II.

It has mooted that tetracycline antibiotics should be preferred to other antibiotics and hydrocortisone for inclusion under price control.

A final decision on all these recommendations are expected to be announced shortly, sources in New Delhi say.

GLINDIA BOYCOTT TO SPREAD AS TALKS FAIL

The pharmaceutical trade has threatened to spread its boycott of Glindia Ltd. to Delhi and hitherto unaffected States from September 1.

This follows the failure of the talks between the company and trade representatives arranged by the All-India Orgnisation of Chemists and Druggists in Delhi recently.

The wholesalers sought a uniform eight per cent margin on all products, inclusive of excise duty. Glindia offered half per cent increase on betamethasone range of products to five per cent and a one per cent increase, from five

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to six per cent, according to a trade spokesman. Wholesalers also sought an increase in retailer margins inclusive of excise duty, which was not acceptable to Glindia.

A Glindia spokesman said all that the company had offered was a one per cent increase in margins on non-betamethasone products. He said the talks failed because the trade insisted on two pre-conditions: payment of new margins with retrospective effect with the proviso that the amount should be paid to AIOCD, and the demand to improve retailer margins.

According to Mr. Kishor Shah, AIOCD Vice-President, the company offered to hike margins on de-controlled products by two per cent if the trade agreed to fixing margin on controlled products as suggested by the company, but exclusive of excise duty.

He said, decontrolled products had a small share of the company's turnover. Additional two per cent on decontrolled products would have fetched about Rs. 60 lakhs more for the trade. Against this, the suggestion to calculate margins exclusive of excise duty would have robbed the trade of Rs. 1.42 crores, he said. In other words, acceptance of the proposal would have worsened the wholesalers' loss. The Glindia spokesman, however, denied having made such a proposal.

PESTICIDE DEVELOPMENT PROGRAMME INDIA

The Pesticide Development Programme India (PDPI) is conducting an Asia and Pacific Regional Training Programme on Quality Control of Pesticide Formulations for the UNIDO sponsored Asia & Pacific Regional Network project on pesticides (RENPAP) under the sponsorship of the World Bank, FAO, UNIDO & UNDP. The programme is scheduled to run for a period of five weeks, beginning 1st November to 2nd December 1988. Representatives of the member countries of RENPAP; Pakistan, Afganistan, Bangladesh, China, India, Indonesia, South Korea, Philippines, Sri Lanka and Thailand, and officials of the sponsoring agencies and WHO are to participate in the training programme. A distinguished faculty drawn from national and international organisations is likely to be on hand to deliver specialist lectures. The programme is highly practical oriented, wherein a bench chemist would learn to use all the modern techniques employed in pesticides analysis.

It has been decided to keep ten seats in the training programme reserved exclusively for the representatives of the Indian Pesticide Industry on first come first served basis. A general fee of Rs. 3000 per participant and for the associate members of the PDPI, a fee of Rs. 2,700 would be levied. The fee would cover course material, tea/coffee, daily lunch and validictory dinner, daily transport from Delhi and local site seeing but would not include lodging and out-station tours. The members of industry wishing to take advantage of this training programme may send their nomination along with a bank draft as above in the name of Hindustan Insecticides Ltd., Udyog Vihar, Gurgaon-122 016, Haryana, India, at the earliest.

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STC secures contracts from Algeria

The State Trading Corporation (STC) has made a breakthrough in the Algerian market by securing contracts for the export of drugs, pharmaceuticals and chemicals worth Rs. 12.76 crores. The contracts were won against stiff competition from firms in advanced countries, it is claimed.

The break-up is: drugs and pharmaceuticals Rs. 10.7 crores, agro chemicals Rs. 1 crore, and chemicals (Sodium sulphate) Rs. 0.96 crore.

Shipments of pharmaceuticals and chemicals worth Rs. 4 crores to Algeria are expected to be completed by the end of September next. Export of drugs and pharmaceuticals worth Rs. 5.34 crores would be shipped in the next financial year.

With the Algerian contracting, STC has export orders on hand worth Rs. 25 crores. The export target for drugs pharmaceuticals and chemicals for 1988-89 is Rs. 33 crores which is expected to be exceeded, according to STC sources.

STC has entered the US market for the first time. It will export dyes and dye intermediates worth Rs. 27 lakhs STC sources expect to get more orders from that country once the first order is executed satisfactorily.

Moreover, it will export dye intermediates and antibiotics worth Rs. 7 crores to China through Hong Kong Efforts are being made to tap this potential market, the sources explain.

Besides, STC will export bulk drugs and antibiotics to West Germany worth Rs. 3 crores in the current year This order was secured recently.

It will also export antibiotics worth Rs. one crore to Syria.

Interestingly, STC has signed contracts for the import of 900 tonnes of Benzene from Turkey. The whole quantity is scheduled to arrive by the end of this month.

Benzene will be supplied to user-industries for export production.

KREBS SWISS SIGNS INDIAN SALT UPGRADING CONTRACT

Krebs Swiss has won a contract to supply a salt upgrading plant to Gujarat Alkalies and Chemicals (GACL) who operate a chlorine plant at Baroda, India.

The project, based on the SALEX process, will have a capacity of 40 t/h upgraded salt. It represents KREBS SWISS's first contract for this type of plant in India. Further orders are expected in the near future because of poor quality of Indian solar salt. In the chloralkali industry, impurities in salt are causing high cost of brine treatment and excessive mercury pollution.

GACL, who use barium carbonate, caustic lye and soda ash for brine purification, expect the SALEX process to reduce their cost of brine treatment chemicals by about a half. Discharge of mercury contaminated sludge will be reduced by almost 70%. The project, estimated at approx. 1.3 crores Rupee (US$1 mill), is expected to have a payback of less than one and a half years. Most of the equipment will be manufactured in India.

The SALEX process, developed by KREBS SWISS, is an advanced, low cost salt purification technology engineered for high efficiency, low losses of salt, low consumption of power and water and high return on investment. The process finds application in chloralkali and soda ash manufacture, refined table salt production and processing of salt in mines and solar saltworks. The achievable product purity is 99.5-99.9% NaCl. The first 15 t/h SALEX plant went into commercial operation in Olhao, Portugal in 1983.

KREBS SWISS, Zurich, is an independent firm of chemical engineering contractors and consultants serving the chemical, electrochemical and salt industries throughout the world.

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Drug firm chief held in FERA case

The president of Burroughs Wellcome, Mr. D. K. Bose, was arrested by enforcement directorate in Bombay on the charge that the multinational pharmaceutical firm siphoned off foreign exchange worth Rs. 1.35 crores in violation of the Foreign Exchange Regulation Act.

Mr. Bose was ordered to be released in a bail of Rs. 5 lakhs by the additional chief metropolitan magistrate, Mr. R. N. Patil.

The enforcement directorate raided the company and Mr. Bose's residential premises and seized incriminating documents, it was stated.

The company allegedly made illegal remittances to its principals, Wellcome Foundation, U.K., by overinvoicing imports made from them.

An additional company secretary of the firm, Mr. D.C.T. Tanna, was interrogated on May 9 this year and the department learnt that the company had imported trimethoxy benzaldehyde from a firm in Holland through the Wellcome Foundation Ltd. In September-October, 1986, two consignments were received. For four consignments weighing 17,800 kg., the Indian company remitted an excess of Rs. 11 lakhs with an intention to retain the funds abroad, it was alleged.

The international prices of a drug triptolidine, was between £515-710/kg. However, Wellcome Foundation allegedly inflated the price and sold it to its Indian subsidiary at prices ranging from £850 to £1047. The inflated amount in the imports made between 1982 and 1987 by the company was about Rs. 1.24 crores, according to the enforcement directorate. The directorate had confirmed the prevalent price of the imported drugs and the invoice price was clearly inflated, the court was told.

Unaccounted cash of Rs. 7 lakhs was seized from the residence of Mr. Bose. A number of important documents were also seized from the residence and office premises. The magistrate directed Mr. Bose to attend the office of the enforcement directorate daily to help in the investigation.

Burroughs Wellcome, originally a 100 per cent foreign company, diluted its foreign holdings to 40 per cent in 1984. Though 60 per cent of the shares of the company are held by Indian public, the management was under the control of the foreign firm.

Though, subsequent to dilution, the company's foreign remittances should have proportionately reduced, in reality it was not so. Since the Indian firm had the facility of importing raw materials from its own counterpart abroad, there was ample scope for manipulating invoiced prices. Sources in the enforcement directorate said.

The company was earlier raided in 1985 and show-cause notices were issued subsequently. The case is still pending for adjudication.

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NOTIFICATION ON GELATINE CAPSULE GEAR IMPORT

The Government has prescribed the conditions which will govern import of 950 high speed hard gelatine capsules basic machines at concessional duty. First, at the time of clearance of the goods, the intending importer shall produce to the Assistant Collector of Customs, a certificate issued by an officer not lower in rank than a Joint Chief Controller of Imports and Exports.

The certificate would testify that the importer has executed a bond specified in this regard by the Chief Controller of Imports and Exports undertaking to export gelatine capsules of three times the value of the imported machinery within a period of five years from the date of clearance of the said machinery.

The certificate would also testify that the importer has undertaken to comply with such instructions as are issued by the Chief Controller of Imports and Exports to monitor and enforce the fulfilment of the export obligation.

Secondly, the intending importers have to execute an indemnity-cum-guarantee bond as specified in the relevant annexures with the regional licensing authority concerned before clearance of the goods through the customs.

The amount of indemnity-cum-guarantee bond shall be equal to an amount equivalent to the difference between the normal rate of customs duty including additional, auxiliary and countervailing duties leviable and the duty actually paid for import under the concessional rates as per the notification

FOOD GRADE PLASTICS :

Measures to ensure easy availability

A series of measures are soon be taken to ensure easy availability of food grade plastics meant for packaging of processed foods.

These steps are being taken, official sources say, as part of the strategy to promote development of the processed foods industry. It has been identified as a major thrust area for exports in the next few years. Packaging of processed foods in internationally accepted modes has therefore assumed significance.

The proposed measures include reduction in import duties of polyester chips bottle grade as well as on equipment needed to manufacture containers made of such plastics. Incentives will also be given for setting up more bottle-making units based on food grade plastics.

Currently, it is pointed out, a large number of processed foods are being packaged in unsuitable plastics. For instance, recycled PVC (poly vinyl chloride) is being used for many processed foods even though this reduces the shelf life of such products.

Processed food manufacturers are reluctant to opt for bottles made of polyethylene terephthalate (PET) or what is known as polyester chips bottle grade, because of high prices of this raw material. With the steps now proposed to be taken, the government expects that PET prices will fall, thereby making use of PET bottles and containers economically viable.

Apart from high prices, another problem being faced is inadequate availability of PET by bottle-making units. At present there is only one indigenous manufacturer of PET with an installed capacity to 1,200 tonnes per annum. The existing demand is about 2,000 tonnes per annum for bottle manufacturers and this is expected to rise to 3,200 tonnes per annum by 1988-89.

Although imports are being allowed to meet the balance requirements of industry, duty has been pegged at 245 per cent ad valorem. This would ensure that the landed cost of these chips is brought in line with that of other thermoplastic raw materials used for packaging purposes.

Similarly, it has been decided to cut the import duty on stretch blow moulding machine used for PET bottle production, from 90 per cent to 35 per cent.

NYLON-6 PLASTIC, A BOON TO INDUSTRY

The use of nylon-6 as a versatile engineering plastic has been assuming greater importance in various fields in the industry. That it has several advantages over ferrous and non-ferrous materials has been proved in the case studies undertaken by the Gujarat State Fertilizers Co. (GSFC).

Nylon-6, the new material has proved, to the best alternative to conventional materials like metals, glass, wood and leather, and has vast scope for different applications in industries like automobile, textiles, engineering, electronics and food and oil packaging. In order to highlight the importance of nylon-6 in national economy, GSFC organised an exhibition in New Delhi. A large number of products made from nylon-6 were on display alongwith panels showing the advantages of this material over many steel parts and as alternative material for packaging.

Mr. J.P. Shah, GSFC Marketing Director, described it as a futuristic plastic with a potential to revolutionise industry and lifestyle of the people. The company is the largest manufacture of Nylon-6.

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Bombay Dyeing hikes DMT price

Bombay Dyeing, the largest DMT manufacturer in the country, has raised its selling price by Rs. 6.000 per tonne to Rs. 27,000 ex-factory. The selling price of Rs. 21,000 per tonne had remained unchanged since 1985.

It might be recalled that the other two DMT manufacturers in the country, IPCL and Bongaigon Refineries had raised their selling prices from Rs. 21,000 to Rs. 23,500 per tonne with effect from August 8, 1988. Reliance Industries, the only PTA manufacturer in the country, had also hiked its selling price from Rs. 23,650 to Rs. 26,500 per tonne from the same date.

DMT and PTA are the major raw materials for polyester industry. The price hike was demanded by the DMT/PTA manufacturers due to high cost of paraxylene, their major raw material. In the absence of domestic availability of paraxylene, Bombay Dyeing relies on 100 per cent imports.

Over the last few months the paraxylene price in the international market has gone up considerably and additionally the import duty on paraxylene was raised from 35 per cent to 120 per cent ad valorem in March 1988.

"This increase, coupled with the rise in the international price of paraxylene and the fall in the value of the rupee, has resulted in a two-fold increase in the landed cost of paraxylene, from Rs. 10,200 per tonne to a staggering Rs. 21,600 today. Of this hike of Rs. 11,400 per tonne, as much as Rs. 7,000 is accounted for by the increase in the import duty," Bombay Dyeing claimed in a statement issued in Bombay on August 19.

The company had represented to the government that all manufacturers of DMT and PTA should have equivalent input costs and for which imports duty on paraxylene should be reduced appropriately. "In the absence of a decision so far on this matter, it has now become impossible for us to continue to absorb the abnormally high cost of paraxylene, as we have done for over five months," the company stated.

During the first four months of 1983, the company's DMT plant had operated at 105 per cent of its rated capacity. "This limits any major cost economies that management can make. We are, therefore most reluctantly, and as a last resort, raising our selling price of DMT to Rs. 27,000 per tonne explant," according to the statement.

"Being dependent 100 per cent on imported paraxylene, our price increase has, of necessity, to be larger than those who rely either fully or substantially on captively produced paraxylene. Should the government reduce the paraxylene duty to equate our paraxylene costs with that of other producers, we will be glad to review our selling price," the company added.

PRESSURE ON FIBRE UNITS

The hike in the DMT price of Rs 6,000 per tonne by Bombay Dyeing has generated lots of confusion in the polyester industry.

The DMT consumers, who get supplies from IPCL and Bongaigon Refineries will receive it at Rs. 23,500 per tonne, while those depending on Bombay Dyeing will have to pay Rs 27,000. Further, PTA will be available cheaper at Rs 26,500. All DMT/PTA consumers, however, will have to sell their polyester fibre and yarn at competive prices.

According to a major DMT consumer of Bombay Dyeing, he will be out of the market unless he sells his product at a loss. He said his company has been hit, first by the galloping cost of MEG and now by the DMT price. The government should either allow other DMT/PTA manufacturers to raise their prices accordingly or should ensure that all polyester units receive their raw material at equitable price, he added

This has raised another issue as to whether more units will prefer to go in for PTA. The problem, however, is whether Reliance Industries is in a position to meet any additional demand, after meeting its captive consumption and the needs of four units who have decided to switchover to PTA.

TEXTILES MILLS STRIKE : DYESTUFF INDUSTRY DIVERSIFIES

The dyestuff industry is coming out of the woods after a torrid time in the wake of the textile mills strike.

According to a study by the commerce research bureau in Bombay the 18-month-old strike in 1982-83 has forced the decaying industry to increasingly diversify and broad-base the product range thereby reducing its dependence on the textile sector to a large extent.

Large and medium units have started shifting their product mix in favour of more technologically sophisticated products. Exports have also perked up in view of the advanced countries' preference to import their requirements.

Dyestuffs are consumed mainly by textile, paints, printing ink and paper industries. Other consumers include coir, jute, leather, plastics; foodstuffs and cosmetics. The textile industry consumers more than 80 per cent of the total dyestuff production.

The number of establishments in the small scale sector was estimated at 900 in 1984 and the production estimate was put at 6,500 tonnes, around 25 per cent of the total production.

Textile fibre consumption in 1970-8 increased by 43 per cent while the population grew by 27 per cent, the difference reflecting the increase in the per capita consumption of textile fibres. Dyestuff consumption grew at 93 per cent for the same period due to increased production of coloured fabrics particularly printed fabrics where consumption of dyestuff is higher.

The present per capita consumption of cloth in India at 15 metres/annum is one of the lowest in the world. It is expected to increase to 19 metres by the end of the Seventh Plan (1989-90).

Based on the past trends, the consumption in textile and other industries is projected to grow to about 62 gms in 2000 from 39 gms in 1980. However, this figure is also less than the world average of 200 gms.

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Despite a drop in net sales to Rs 20.57 crores from Rs. 22.29 crores Mafatlal Dyes, and Chemicals earned a higher gross profit of Rs. 97.9 lakhs during the first six-month period ended June 1983 against Rs. 90.1 lakhs in the same period last year.

The net profit is also better at Rs 50.73 lakhs against Rs. 47.80 lakh after depreciation (Rs. 7.44 lakh against Rs. 7.40 lakhs) and taxation (Rs. 39.79 lakhs against Rs. 34.90

Acetic acid from methanol

Recently there was some controversy acetic acid production from metha- route. The alcohol-based industries iterated that the country has enough stalled capacity of acetic acid based alcohol as the feedstock. It is opposed to setting up of any acetic acid pacity using methanol as the feedock, which in turn is produced from s. The irony is that one of the exting acetic acid manufacturers had o applied to the Government for acec acid manufacture based on methal in 1986 along with some other apcations. The Government after taking o consideration several factors, had ken a conscious decision in the end f 1986 on giving letter of intent to ujarat Narmada Valley Fertilizer Co. NFC) for producing 40,000 tpa acec acid using methanol as the feedock (for which it has a licence for 00,000 tpa).

Recently some structural changes e taken place in the alcohol and cohol-based industry mainly decause ne of the three major users of alcohol viz. IEL closed down its plant for the manufacture of LDPE in West Bengal. However, there are reports that this second hand plant has been bought for installation in UP. The second plant viz. Synthetics and Chemicals resorted to imported butadiene instead of producing the same using alcohol which they have been doing all these years. The third plant viz. Union Carbide is closed down in Thane on the grounds that it is not safe to operate. The reasons for this state of affairs is largely due to short term policies followed by state governments in pricing alcohol, levying excise duty, transfer duties and so called 'export duties'. If alcohol is really going to be surplus, should not the country consider setting up import substitute products, butanol and butadiene to name some. The foreign exchange savings shall be enormous. Further, using acetaldehyde as the building block, some products other than acetic acid and could also be considered. It may also be worth considering blending alcohol with motor spirit, which we have, of late realized that our demand exceeds that produced by our refineries, thanks to the liberal automobile policy of Government.

- It may be added here that All India Alcohol Based Industries Development Association has always been representing that its members do not get adequate quantities of alcohol for operating their plants to fairly good capacities. Even though acetaldehyde and acetic acid plants are scattered all over the country, one finds transportation of these commodities over long distances e.g. from UP/Bihar/Maharashtra to Rajasthan/Gujarat. Though statistics show that adequate installed/approved capacity of acetic acid exists in the country, some of the units have closed without any chance of their reopening. Further, efficiencies of some of the plants also need a review. Moreover, demand of acetic acid is increasing in dyes and pharmaceuticals.

It may be mentioned here that whenever a proposal for alcohol-based project is put up by an 'alcohol deficit' State, it is rejected on the grounds of non-availability of alcohol in that State.

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When the 'alcohol deficit' States put up a proposal for a project using an alternate feedstock to alcohol, it also does not find favour because alcohol is available in other 'surplus' States. This policy acts as a hindrance to development. Moreover, the difficulties in getting inter-state alcohol allocation and release in addition to high cost of transportation are too well known to need any elaboration.

When large PTA plants are being considered in the country, with an investment in excess of Rs. 100 crores for each of the plants, this investment needs to be supported with assured and dependable supply of various inputs including acetic acid. This could only be possible if large plants of acetic acid are set up, based on feedstocks other than agrobased. Considering the fact that a PTA plant is being set up in the western region which also has large gas reserves, the choice of location and feedstock for acetic acid plant are obvious. We may also learn from the track record of alcohol as well as acetic acid production in the country and create a base for an alternate feedstock, more so when it is abundantly available. Such a proposal also needs encouragement from lower cost of production angle. We seem to be living in a high cost economy for so long that we do not want to come out it. With suitable pricing of gas and fuel, acetic acid based on methanol can be much cheaper than the current ruling prices.

From time to time, the Government of India had appointed expert committees for studying alcohol based industries. It is likely that some of the earlier recommendations are not valid today in view of changing scenario. However, the latest report of Dr. Ganguly Committee on alcohol based industries merits immediate consideration of Government.

In summary, the fact remains that some of the existing alcohol based acetic acid plants have closed down and some are inefficient/obsolete. There have been wide fluctuations in the prices of indigenous acetic acid in addition to erratic supplies at times, necessitating imports. Existing acetic acid plants, having low book values, can be encouraged to switch over to import substitute products, using acetaldehyde as the building block. Acetaldehyde based products may be de-licensed on the lines of phenol based products, delicensed recently. Alcohol, if surplus in the long run, may be used in producing import substitute products and in blending with motor spirit to supplement the ever increasing fuel needs of automobiles. Such steps are likely to result into enormous savings of foreign exchange against one time cost of technology for acetic acid based on methanol. Large acetic acid plants, using gas based methanol, can only ensure consistent supply to large PTA plants. There is also a need of utilizing gas for purposes other than fertilizers,
rochemicals and power generatio

It has been the policy of the G
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with the prime objectives of brin
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vantage of economies of scale
encouraging adequate availability
products with fair competition,
proposal of encouraging methanol
sed acetic acid plants is in line
the Government of India's policy
should not be blocked at this adva
stage, when GNFC has gone ahead
finalised foreign collaboration a
ment with the process licensor. It
be mentioned that Monsanto had
loped the process of manufact
acetic acid from methanol and
are very few plants in the world v
are licensed to this technology. G
was successful in negotiating this t
technology for the first time in
from B.P. Chemicals, UK who ar
sub licensors of this technology
have signed FC agreement. B.P.
micals have now decided not to l
ce this technology to new incumb

GNFC also finalised foreign con
tors for carrying out the detailed
neering for this Rs. 70-crore (app
project after evaluating several bids
after due negotiations. — A. K
RATHI in FINANCIAL EXPRESS.

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SC turns down plea against modis

e Supreme Court has turned down lea of monochloro acetic acid A) manufacturers that the Modis estrained from implementing their 180-lakhs MCA project in Alwar, sthan.

ght MCA manufacturers had objec- to the proposal of Modi Alkalies Chemicals Ltd. to set up a 2,000 plant. Their objections had earlier turned down by the Monopolies Restrictive Trade Practices Com- ion (MRTPC). The Supreme Court eld the MRTPC ruling.

he MCA manufacturers objected to proposal on the ground that a large se like Modis ought not to enter field where medium-size and small le units are already struggling to the product because of stagnant and. The bulk of MCA is captively sumed, and trading is only in the on of 2,500-3,000 tonnes, accord- to industry sources.

The existing units together have nd 10,000 tonnes of installed capa- . There are four manufacturers in organised sector and six small- e units, out of which three are un- the sick list and are beneficiaries of Government's nursing schemes. The creation of fresh capacity, therefore, is unjustified, they told the court. The third objection was that the Modis are going in for foreign technology which is again unwarranted.

The Modis argued that demand for MCA is bound to increase because of the growth in the consumption of MCA-based weedicides, pesticides and other chemicals. Also, MCA had export potential. It attributed the underutilisation of existing capacity to "inadequate technology."

MCA is made by chlorination of acetic acid. (The Modi caustic soda plant has surplus chlorine for captive use). The company will reportedly pay Rs. two crores for purchase of foreign technology. The Regional Research Laboratory of Hyderabad had expressed its inability to provide the technology sought by Modis and hence the decision to go for collaboration.

PLEA FOR IMPORT DUTY REDUCTION

The polyester industry has urged the government to drastically reduce import duty on raw materials such as MEG, DMT and PTA.

This plea has been made in view of the spiralling international prices of these raw materials as also to lessen the impact of the steep hike in their prices effected by indigenous manufacturers.

The Association of Synthetic Fibre Industry, in a representation to the ministries of finance and textiles and to the department of chemicals and petrochemicals, has pleaded for an import duty reduction from the existing level of 195 per cent to 90 per cent ad valorem in the case of DMT/PTA. In the case of MEG it has requested for reduction in customs duty from 90 per cent ad valorem to a specific rate of Rs. 1,200 per tonne.

PLEA TO REMOVE PRICE CONTROL ON DRUGS

Participants at a seminar conducted by the All India Organisation of Chemists and Druggists Educational Trust on Aug. 21, demanded removal of the existing price control and abolition or reduction of taxes and duties on medicines, at least on life-saving drugs.

Speaker after speaker at the seminar on 'price control on medicine—its relevance to consumers' said the drug industry was in 'great trouble'.

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NEWS DIGEST

RAW MATERIAL PRICE HIKE HITS PAINT UNITS

The paint industry has seen a negative growth of 7.2 per cent for the period April 1987 to February 1988.

Among the reasons for this stunted growth is indiscriminatory' pricing policy for the main raw material titanium dioxide and rutile, according to a press note of the Indian Paint Association.

While the industry is far from healthy, Kerala Metal & Minerals Ltd. (KMML), Quilon, sole manufacturer of these raw materials, revised the selling prices of rutile five times in the last two years and quantum-wise it was as much as 66 per cent.

Although the state sector unit has an installed capacity of 24,000 tonnes of rutile and it went into commercial production in December 1984, since the date of commencement of the plant, it produced maximum of 7,000 tonnes per annum.

The press note adds that the raw material, ilmenite for manufacture of rutile is available in abundance in the country. Cost of production of rutile in India cannot be higher than the cost of production of rutile elsewhere in the world. Yet selling price of KMML rutile is $4,225 per tonne compared to world price of $2,300 per tonne.

The association alleges that KMML is exploiting monopoly situation by revising selling price in a manner prejudicial to the interest of the paint industry and the country at large.

The latest price increase on July 18 this year amounts to 24.5 per cent in one stroke which has delivered a mortal blow to the already ailing industry.

BIOLOGICAL E. VENTURES IN POULTRY VACCINES

The Hyderabad-based Biological E. Ltd., a leading manufacturer of life-saving drugs like Neo-Hepatex, ATS and Tripac, is setting up a Rs. 100-lakh joint venture for producing a wide range of poultry vaccines in collaboration with the Solvay Group of Belgium world's largest manufacturer of poultry vaccines.

The new company, Solvay B.E. Animal Health Ltd., will begin operations at Gaganpahad in Ranga Reddy district of Andhra Pradesh to produce modified live poultry vaccines, inactivated poultry vaccines, bacterins and diagnostic aids, according to Mr. Ravi Chowla, Director of the Bombay-based Egg and Poultry Industry Centre (EPIC). According to him, many of the items will be produced for the first time in the country.

With this venture, Indian poultry farmers will have access to the latest technology and experience of Salsbury Laboratories Inc. of US, a subsidiary of Solvay Group. This venture, which was recently approved by the Government, is also the first to have a equity participation from the foreign collaborator, while till date Indian poultry vaccine companies, including the one belonging to Pune-based Venkateswara hatcheries have had only technical collaborations from abroad, it is said.

The Solvay Group will hold 40 per cent equity and provide certain specific pathogen free egg unit technology to the Indian company free of cost. The new company has planned to manufacture seven important poultry vaccines in the first year to be followed by six more ranges in the second year and another three in the third year.

The agreement provides for training of Indian personnel at Salsbury Lab's veterinary biological facilities in the US and Brazil besides establishing a Salsbury Poultry Health School in India.

IICHE OFFICE BEARERS

During the Seventh Annual General Meeting held on 7th August, 1988, the following were elected as members of the Executive Committee of Indian Institute of Chemical Engineers, Ahmedabad Regional Centre, for the year 19-

Chairman : Dr. M. C. Chhabria Vice-Chairman: Shri A. K. A. Rath Hon. Secretary : Shri R. N. Shukl Hon. Jt. Secretary : Shri D. Bhattacharya, Dr. C. M. Ramasamy; Ho Treasurer : Shri H. R. Shah; Members Shri G. C. Joshi, Shri H. L. Khar Shri M. N. Patel, Shri F. B. Virant Shri P. J. Bhatt, Shri M.L. Agarwal Immediate Past Chairman : Shri Arun P. Sheth.

NICCO BAGS DSP NAPHTHALENE PLANT CONTRACT

The Nicco Group's project divisio has bagged a high-technology Rs. 4.5 crore turnkey contract from Durgap Steel Plant for establishing a facili to produce 7,500 tonnes per annum 98.5 per cent pure naphthalene fro crude oil Mr. Rajive Kaul, head of th group, said Nicco has tied up wi BEFS technologies of France for know how on the DSP project.

One of the special features of t plant offered by Nicco is that it has fully computerised process control, complete operation controlled throu a PC with hot back-up. Nicco's proje division, which has a Rs. 12-crore pl order intake in the two-and-half yea since inception, has made bids for an ther Rs. 55-crore worth of turnk overseas contracts. On the domes front, the company has on hand co tracts from a number of clients, incl ding NHPC, DSP, Hindustan Zinc a the Calcutta Metropolitan Developme Authority.

FIRST BENZENE CONSIGNMENT TO ARRIVE SORTLY

The first import consignment of be zene, arranged by the Government ease the current shortage of the ma rial, is expected to arrive at Kan shortly.

Another import consignment is pected to arrive by September end, cording to industry sources in Bomb However, the quantity involved co not be ascertained.

A delegation of chemical manufac rers had called on Mr. H. K. Secretary, Department of Chemic and Petrochemicals, recently. F ing his intervention, refineries have gun releasing "small quantities", INDO-USSR SEMINAR ON

Industrial applications of electron accelerators

An Indo-USSR Seminar on "Industrial Applications of Electron Accelerators" organised by Bhabha Atomic Research Centre (BARC) and the Academy of Sciences, USSR will be held during Nov. 1-3, 1988, at BARC, Bombay. The Seminar is sponsored by the Department of Science and Technology, Government of India. The Seminar will include presentations by eminent Soviet scientists, covering the manifold applications of Electron Beam (EB) technology practised in the industry, as also presentations by Indian participants covering areas of potential and immediate applications in the Indian industry. The seminar will enable the Indian industry to obtain first hand information about Electron Beam applications in various spheres of industry.

Objective

In the expanding field of radiation processing Electron Beam (EB) technology has occupied a pre-eminent position today. EB technology enables high speed processing because of the ability of EB machines to deliver large radiation doses in a short time. Hence industrial processes such as wire and cable cross-linking, continuous production of heat shrinkable packaging materials, tubes and insulators, surface curing of coatings and paints on various surfaces, special coatings for audio and video tapes, printing, lithography, routinely employ this technology. EB processes enable producing better quality materials, reduced energy consumption and reduced environmental pollution. EB cured wires and cables, polyethylene foam, polyethylene pipes for hot water circulation are household products in the developed countries. The other areas of potential applications include flue gas detoxication and sewage sludge hygienisation, where EB processes have certain unique advantages.

Recognising the importance of this technology to the fast developing Indian industry, this Seminar has been arranged to coincide with the formal commissioning of the industrial research EB accelerator at BARC, Trombay. The Seminar will greatly help in disseminating the latest information on EB irradiation processes and technology and will open up avenues to Indian industry for updating the technology and introducing new products.

Programme

The seminar will comprise of presentations by invited speakers and panel discussions only. It is proposed to bring out the proceedings of the seminar in the form of a publication. The seminar will include visits to EB accelerator facility and other radiation facilities at BARC.

There is no registration fee for the seminar.

Further information can be had from Mr. K. Krishnamurthy, C/o. BARC, Trombay, Bombay.

MOVE TO EXPORT ENTIRE NALCO OUTPUT RESENTED

The reports that the Government has decided to export the entire alumina and aluminium production of NALCO during 1988-89 has jolted the non-ferrous metals trade and industry which has been already reeling under acute supply crunch.

In a telegram sent to the Prime Minister, the President, Bombay Metal Exchange Ltd., Mr. Seventilal Morakhia, has stated that the Government decision is the result of basically wrong data on crucial parametres.

While there is no objection to the export of alumina, the decision to export aluminium at a time when the country has a backlog of shortage which will reach atleast 40,000 tonnes by the end of 1988-89 as per the estimate of none other than the Minister of Steel and Mines, would ruin small and medium aluminium user industries, he added.

NALCO's actual production during the year has been progressively scaled down from 1,30,000 tonnes to 80,000 tonnes. Besides, MMTC has stopped imports for more than 10 months. This has created an acute short-supply and the entire scenario was brought to the notice of the Minister for Steel and Mines, Mr. Fotedar, during a dialogue with him on May 30, 1988.

Mr. Morakhia appealed for a thorough re-check of the data and review the decision to export aluminium.

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No proposal yet from UC Chembur labour

The Industries Minister, Mr. J. Vengal Rao assured the Lok Sabha that the Centre would sympathetically consider handing over the Chembur unit of Union Carbide to the workers if they formed a co-operative society.

The unit, which produces a vital raw material for the plastic industry, has been closed for about a year, but workers are being paid wages.

Replying to a half-hour discussion on the subject, raised by Mr. Sharad Dighe, Mr. Rao said the workers had neither formed a co-operative society nor forwarded any concrete proposal for takeover.

Replying to persistent demands from members from both sides that the Government either take over the unit or merge it with the public sector Indian Petrochemicals Corporation Ltd. (IPCL), the Minister said IPCL was against this because of its location and the hazardous nature of the unit.

Mr. Rao said even if the Government wanted to take over the unit over, it has to be shifted from Chembur, with the Maharashtra Government having already issued notice for shifting the plant on environmental grounds.

He agreed with members that there is acute shortage of the raw material, low density polyethylene in the country and a large quantity is being imported every year.

On the reported move of the company to sell the plant to a third party, the Minister pointed out that any prospective buyer would have to deposit the necessary money with the court.

Mr. Rao said the Government is considering various suggestions made to revive the unit keeping in view the litigation it is entangled in with Union Carbide at Bhopal.

Members decried the Government's rigid stand on the ground that a tragic incident had already taken place at Bhopal unit of this company. This is stretching too far. More over the Chembur unit's product mix is entirely different from that of the Bhopal unit, they argued.

With the closure of the Chembur [illegible] in Maharashtra are facing the problem of storing 800,000 tonnes of industrial alcohol which this unit was consuming, they pointed out.

Some members asked why the Minister had sought the opinion of the Attorney General of India for taking over the unit.

Pacifying the members, Mr. Rao said the issue is being examined at length, particularly in the light of the Bhopal litigation.

METHANOL PROJECT: CHHABRIAS MoU WITH GIIC

The well-known Chhabria group has joined hands with the Gujarat Industrial Investment Corporation (GIIC) for setting up a project to manufacture various grades of methanol.

A memorandum of understanding for setting up the project was signed in Ahmedabad recently by Mr. M. R. Chhabria, Chairman of Chhabria group of companies and Mr. S. K. Shelat, Managing Director of GIIC.

In the course of his one-day visit to Ahmedabad, Mr Chhabria also signed two other memoranda of understanding. Of these, one was with Gujarat Alkalies and Chemicals Ltd. (GACL), a company promoted by GIIC, for the manufacture of secondary alkyl sulphonates (SAS). The other one was with Gujarat Communications and Electronics Ltd. (GCEL) to participate in Gujarat Data Electronics Ltd.

The Managing Director of GACL Dr. P. K. Das and the Managing Director of GCEL, Mr. N. Gopalswami, signed the agreement on behalf of their respective companies.

GACL is considering to set up the SAS plant with the collaboration of Hoechst, West Germany. GIIC and the Chhabria group will work together to develop various grades of methanol.

OIL REFINING CAPACITY TO GO UP ONLY 3.15 M.T. BY '92

The current oil refining capacity in in the country is projected to increase by only 3.15 million tonnes by 1992, the Rajya Sabha was informed on Aug. 22nd.

The proposed refining capa 1992 is 51.85 million tonnes, a pared to the current refining c of 48.70 million tonnes, the M for Petroleum, Mr. Brahm Dutt, in a written answer.

The Minister said the owner additional refining capacity wa decided on economic consid rather than on the interest of o parties.

Answering another question, t nister said the Government had ved the formation of a joint company with Hindustan Pe Corporation and IRIL as co-pr for setting up the Mangalore r

The initial shareholding by and IRIL would be 26 per cen The balance equity participation be by the public including n dent Indians.

The joint venture company prepare a detailed project repo in 12 months from the date of poration of the joint venture a mit the same for Government a

He said the decision to go joint venture was made with a getting additional resources for ject.

FLUIDIZED-BED REACTOR FR BARC

A fluidized-bed reactor syste ensures uniform incineration o at a relatively low temperatu continuous manner has been by the Bhabha Atomic Resear tre (BARC).

Wet polystyrene type ion resins are widely used in nucle try, particularly in the primar transport (PHT) system of nu actors. Incineration is an effec thod to reduce the volume of tive waste materials from such change systems before the fin sal.

According to a BARC relea runs of the incinerator have couraging results in respect o lume reduction and trapping particulate material.

The system consists of fluidized bed reactor connected off gas cleaning unit. The close control of temperature suppresses the escape of waste [illegible]

TES SUPPLY:

PSUs seek inputs at global prices

tor units are seeking raw nternational prices in re- pplying intermediates to ex- obal prices against surren- nce licences.

sal to supply intermediates at world prices is part of strategy paper prepared by rce Ministry, which was nd approved by the Cabinet on Exports held under the p of the Prime Minister re-

e scheme, public sector dian Oil Corporation, Hin- nic Chemicals Ltd, and ity of India Ltd., would be supply chemical and other s needed by exporters of agro-chemicals and plas- perational details of the yet to be worked out.

was first mooted by Mr. a, President of the Federa- ian Export Organisations o wanted the public sector erve 10 per cent of their for distribution to exporters ices. His proposal envis- llowing steps to compensate for supplying material at es against surrender of ad- es.

against advance licences/ hould be treated as import. o sales tax or octroi levies. ector units supplies to exporters should be treated on par with physical exports, involving fiscal benefits under 80 HHC, concessional rate of packing credit, additional licences, CCS and recognition as export/trading house.

However, sources in public sector units said that for the chemical industry, the prime requisite for supply of material at cheaper prices is supply of their feedstocks at international prices. "We cannot sell additional licences at a premium. We should get our feedstock and basic utilities at global prices," they said.

FIEO has requested the Government to expedite the announcement of modalities of the scheme since five months of the current year had already passed. The scheme should be worked out at the earliest so that the export community could benefit.

As per the July 29 notification, the Government has announced input-output norms for 354 items under Appendix 13C. If the modus operandi of the intermediate supply scheme is announced without delay, the country's export could be lifted to Rs. 20,000 crores as against the estimate of Rs. 18,795 crores.

PRODUCTION LOSS AT HZL

The Vizag unit of Hindustan Zinc Limited (HZL) incurred a production loss of 5,200 tonnes in the four-month period April-July this year on account of the 80 per cent power cut imposed by the Andhra Pradesh State Electricity Board. The unit was getting only 4 MW during March 14-July 28 against its requirement of 20 MW.

The total domestic production of zinc dropped from 76,388 tonnes in 1986-87 to 60,577 tonnes in 1987-88 because of shortage of power and water. Total imports of the metal by MMTC increased from 42,003 tonnes in 1986-87 to 52,528 tonnes in 1987-88.

The net loss of production of the metal suffered by HZL because of power cut in 1988-89 (upto July 1988) was 2,358 tonnes taking into account the loss which could be offset to some extent by power made available from captive diesel generating sets.

The price of zinc was raised thirteen times during the last three years (September 1985-August 1988).

The value (in crores of rupees) of tin and copper imported by MMTC during 1986-87 and 1987-88 is given below :

Year	Tin	Copper
1986-87	27.38	78.31
1987-88	18.22	215.07

The value of tin and copper produced in the country in the same period is : (Rs. in crores)

Year	Tin	Copper (wire bar)
1986-87	—	102.62
1987-88	.08	129.13

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NRDC awards for inventions

The National Research Development Corporation (NRDC) has announced the 988 Independence Day awards for nnovative inventions under its promo-on programme. A total of 19 people hare the cash awards amounting to Rs. .6 lakhs and certificates of merit for 0 inventions in key areas of national mportance.

The Corporation has also declared he awards of gold and silver medals ponsored by the World Intellectual roperty Organisation (WIPO) for 1987 nd 1988. While one gold medal has een shared by two, the other gold nd silver medals have been awarded ndividually.

WIPO is one of the specialised gencies of the United Nations and RDC has been authorised to select uitable inventions for the award.

For the NRDC awards, Mr. Shailen-ra Sharma, Mr. Ravindra Hiralal Aul-ck. Mr. E. Hari Babu and Mr. Syed slam of Bharat Heavy Electricals td., Hyderabad, have been jointly warded a sum of Rs. 35,000 for de-eloping erosion-resistant tungsten car-ide thermo weils which are used in hermal power boiler furnaces.

These new weils will replace the im-orted stainless steel ones which wear ut very fast because of the high silica nd ash content of Indian coal.

Mr. V. K. Bassi of V. Automat and struments Pvt. Ltd., New Delhi, has en awarded Rs. 25,000 for the de-elopment of a interface level control-r used in the separation of crude oil om water. The instruments have been pplied to the Oil and Natural Gas ommisstion (ONGC) and the Indian il Corporation (IOC).

Mr. Nitin S. Mehta and Mr.t Ma-ukar M. Chandekar of Bombay have en jointly awarded Rs. 25,000 for venting an open width vacuum hydro tractor which is used in the textile dustry for the removal of process li-or from wet fabric. Apart from a ving of 40-50 per cent of thermal ergy, the device also increases the al production by 30-50 per cent.

Mr. G. Mathiyalagan, Mr. S. Vija-rangam and Mr. S. Ranganathan of EL (Tiruchi) get Rs. 10,000 for developing an improved flame scanner used to monitor the flame in boilers and thus protect furnaces from explosions.

Dr. Vinod Shankar Saxena and Dr. Sarnam Singh Tomar of the Indian Agricultural Research Institute (IARI), New Delhi, have been awarded a certificate of merit for formulating a more effective insecticide for DDT-resistant insects. It contains 25 per cent DDT and an inactive isomer of benzene hexachloride.

Dr. S. Sekar and Mr. A. Marimuthu of BHEL (Ranipet) have also been awarded a certificate of merit for the development of digital on-off controller for electrostatic precipitators used for preventing air pollution from thermal power plants.

The 1988 award of gold medal goes to Mr. Anant B. Marathe and Mr. Balkrishna B. Bapat of Maratha Research Foundation for developing a martex threshold relay. It can be used for the protection of electrical induction motors from single phasing, electrical or mechanical overload or loose connections. The silver medal has been bagged by Mr. Devendra S. Naik of Surat for an economical jet dyeing machine. It lowers power consumption, utilises less space and reduces operating cost.

SHRAM AWARDS

The Union Government announced recently the Prime Minister's Shram awards for 1988 to 15 workers including two women in recognition of their outstanding cotribution towards production and exemolary zeal and enthusiasm in discharge of their duties.

The Shram Bhushan award has been shared by a team of five workers from the State-owned National Thermal Power Corporation (NTPC) Ramagundam super thermal power project, Andhra Pradesh. They are Mr. K. S. N. Raju, Mr. R. Christopher, Mr. S. V. V. Pulla Rao, Mr. S. C. Raju and Mr. Rajesh Kumar.

The group made significant contributions through innovative ideas in ash

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handling which resulted in tremendous saving.

There is no Shram Ratan award winner this year also.

The Shram Vir award winners are Mr. P. D. Simon from Zircaloy Fabrication Plant in Andhra Pradesh, Mr. K. K. Ponnappan from Hindustan Photo Films, Tamil Nadu, Mr. Kedarnath Choudhury from SAIL, Rourkela and Mr. S. K. Nandi and Mr. G. D. Lohar from Ordnance factory, Maharashtra.

Shram Shri awardees are Mr. S. B. Balasundaram from Hindustan Aeronautics Ltd., Mr. P. A. Thomas from BHEL Hardwar and Deolal Mistry from Karhata colliery, Ranchi.

The women recipients of the Shram Devi awards are Mrs. Sheela Mishra of Indian Telephones, Rae Bareli and Mrs. Raisa Begum of BHEL, Bhopal.

The Government has also announced awards for the best technology development through indigenous research and development efforts and for control of pollution and hazards in the chemical industry.

The Indian Institute of Petroleum, Delhi and Engineers India Ltd., New Delhi will get the first award jointly for excellence in technology development. They developed a process for extraction of aromatics from naphtha streams, a technology being implemented successfully by the refineries.

Indian Petrochemicals Corporation Ltd. (IPCL) will receive the award for control of pollution and hazards in the chemical industry. IPCL achieved 10 spells of more than one million man-hours and one spell of more than three million man-hours without any accident.

The awards were instituted by the Department of Chemicals and Petrochemicals.

SLIGHT RISE IN FERTILISER CONSUMPTION LIKELY

Fertiliser consumption this kharif season will be merely 10 to 15 per cent more than during the last kharif, good monsoon this season notwithstanding.

This prediction has been made by Mr. Pratap Narain, executive director of the Fertiliser Association of India.

Addressing members of the forum of agro-rural media farm in New Delhi recently, Mr. Narain also said that according to his estimate, foodgrains production this year will be 160 million tonnes as against the official target of 166 million tonnes.

He said that the uncertainty on important policy matters with respect to production, marketing and pricing should be avoided in order to ensure rapid growth.

Mr. Narain said that apart from other compelling reasons such as employment and growth, continued thrust on setting up fertiliser capacity within the country besides ensuring the health of existing units, is imperative to prevent difficulties and even exploitation in the international market which may arise due to neglect of Indian agriculture.

GSFC RECORDS INCREASE IN OUTPUT SALES

The Gujarat State Fertilizer Co (GSFC) has recorded a substantial increase in the production and sales of fertilisers and industrial products over the previous year.

A review of GSFC's current year' overall performance during the first seven months has indicated that the production of fertilisers has been 6,57,04 tonnes as against 4,44,440 tonnes the previous year, registering an increase of 48 per cent.

Similarly, the offtake of fertiliser has also recorded a substantial increase of 114.74 per cent with 4,15 310 tonnes of sales for the curren year as against 1,93,397 tonnes of th corresponding period of last year.

GSFC's fertiliser production targ for the 12-month period of the curre year has been set at 10 lakhs tonn with a matching sales target. The cu rent year's bright agricultural prospec due to good monsoon will give a boo to fertiliser off-take and the compa expects to distribute the entire produ tion during the kharif and rabi s sons.

The performance in respect of t industrial products has also been ec ally impressive. Caprolactum product has shown an increase of 47 per c with 11,800 tonnes as against 8,0

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POWER MACHINERY IMPORT :

Duty cut to cost Rs. 200 cr.

The Union Government would be losing an estimated Rs. 200 crores in a year, following its decision to reduce the import duty on machinery and equipment for electric power generation for captive use by industries.

There is, however, no firm estimate of the revenue loss on account of the duty reduction, as this would depend on the number of units setting up imported captive power plants after being encouraged by the duty relief.

A recent notification had fixed the new import duties at 35 per cent ad-valorem on generating sets of capacity ranging between 2.5 mw and 50 mw and 25 per cent ad valcrem on sets of capacity above 50 mw. Earlier, the duty on all such captive diesel generating sets was 85 per cent, if these were imported by industry.

According to the Government, even though revenue loss may be a substantial amount, the concession would go a long way in overcoming the shortage of power for industrial production. Industry had all along been clamouring that power shortage is affecting its production and it could not import generating sets at reasonable prices, as the duties are high. There is also a a shortage of indigenously available generating sets, it is stated.

The Government notification, which was issued in response to this plea of industry, would be valid up to March 31, 1989. The reduced duty would not be applicable only when the sets use fuel other than low sulphur heavy stock or heavy petroleum stock and when the sets are imported as part of a project. The project import duty rates for such generating sets are different.

Imports of such sets on reduced duty would also have to produce necessary certificates from the Directorate General of Technical Development (DGTD) or from the Commissioner of Industries of the State Government concerned.

BINNY TO PLAY ACTIVE ROLE IN WIND MILLS PROJECT

Binny Engineers Ltd. will be actively involved in a Rs. 10-crore project proposed to be set up in Tamil Nadu by a Delhi-based company to manufacture wind mills with Danish technology.

The project, likely to be located near Madras, is being established by Vestas RRB India Ltd., a venture promoted by RRB Consultants and Engineers Ltd. in collaboration with Vestas Wind Systems, Denmark, a world leader in the field.

Mr. Rakesh Bakshi, Managing Director of RRB group told newsmen that Binny Engineering will supply on a long-term basis (20 years) 60 per cent of the wind mill machine components and fabricated steel parts for the project.

This will prove a major diversification for the engineering division as it will get orders to the tune of Rs. 6 lakhs in the manufacture at a cost of 12 lakhs.

The company has plans to manufacture in a year 100 wind mills each of 100 KW and another 100 units each of 200 KW. In the first year, it intends to make 50 units. The Danish company is providing 25 per cent equity capital.

The production will commence within a period of 12 months. The manufacture of turbines falls under delicensed category and the Government is expected to clear the foreign collaboration within a month.

Mr. Bakshi said the company will seriously pursue the indigenisation programme and the content is expected to be 80 per cent in the second year of operation. There is also a proposal to establish wind parks' in the States of Tamil Nadu, Andhra Pradesh and Gujarat.

He said Vestas, is the largest manufacturer of wind turbines with proven technology and more than 3000 units are installed in over 10 countries.

RRB is also active in the field of non-conventional energy sources and has commissioned on a turn-key basis Vestas wind electric generators (55 kw to 90 kw capacity each) in States like Tamil Nadu, Maharashtra, Gujarat, Orissa and Madhva Pradesh.

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COMPANY NOTES

FACT SETS NEW RECORDS

The Fertilisers and Chemicals Travancore Limited (FACT) continued to maintain its good performance in production in July. FACT, which had exceeded its production targets during the first quarter, exceeded its production targets for nutrient Nitrogen and nutrient P_2O_5. The production of nutrient Nitrogen was 23,258 tonnes against the target 21,988 tonnes improving upon the targets by 5.7 per cent. In respect of nutrient P_2O_5 the production of 12,273 tonnes was 26.25 per cent higher than the target of 9,720 tonnes.

Total production of fertilisers during the four months of the current financial year ending July 31, was 3,25,768 tonnes which had shown an increase of 34 per cent over the total production of 242,862 tonnes during the corresponding period last year. The sulphuric acid plant of Cochin division of FACT registered a record monthly production of 30,650 tonnes in July improving the previous best of 29,955 tonnes in October 1985.

FACT maintained its good sales performance of the first quarter by achieving a sales of 1.10 lakh tonnes of fertilisers in July against the month's target of 1.01 lakh tonnes, i.e., an achievement of 109 per cent of the target. The sales for the period April-July is 3.3 lakh tonnes against the target of 2.68 lakh tonnes — an increase of 25 per cent.

GAL TO MERGE WITH ATUL

The Gujarat Aromatics Ltd. (GAL), a sick unit of the Gujarat Industrial Investment Corporation (GCCI) in joint sector, would soon amalgamate with the Atul Products Ltd. of Lalbhai group saving about 300 persons from losing their jobs.

GAL had been incurring losses due to lack of demand for its main product mix cresols. Atul has planned new product-line to to increase the plant's capacity utilisation.

Atul's own performance during the first six months was better than the corresponding period last year. Its cumulative sales increased from Rs. 36.63 crores to Rs. 57.24 crores while profits before depreciation increased from Rs. 0.72 crore to Rs. 4.06 crores, a company release said.

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Gujarat State Fertiliser Company

A handsome dividend amount of Rs. 3.82 crores has been given by the Gujarat State Fertilizers Company to the Gujarat Government for the year 1987 on its investment in the Company's equity share capital. This dividend disbursement gave a return of 87% on the Government's original investment in the equity of Rs. 4.41 crores in GSFC. At the present stock market prices of Rs. 121 per GSFC share, the value of this investment stood at Rs. 154.18 crores which was almost 35 times of the value of original equity investment. GSFC's Chairman Mr. H. R. Patankar accompanied by the Managing Director Mr. P. V. Swaminathan presented a cheque for the dividend amount to the Chief Minister Mr. Amarshinh Chowdhary at Gandhinagar on July 4. GSFC's Chief Financial Controller Mr. P. V. Joshi was also present on this occasion. GSFC has been regularly paying dividend to the State Government for the last ninteen years and it had so far given an amount of Rs. 30.26 crores to the State Government by way of dividend on its equity and preference shares.

The State Government's investment in GSFC has been most rewarding. In the Company's total equity capital of about Rs. 9 crores, the State Government's original share was Rs. 4.41 crores. With the four bonus issues the Government's original investment of Rs. 4.41 crores rose to
12.74 crores.

From a small fertilizer ur
GSFC has today grown into
monolith of multi-plants, mul
products, multi-technologies a
multi-locational complex with
excellent productivity record a
a strong financial base and
was for this reason that the Co
pany could weather the la
three years' severe drought situ
tion coupled with glut and oth
bottlenecks and turned out go
results for the year 1987 throu
diversification and judicious c
porate management. The divi
end was raised to 30% fro
27% on the enlarged capital a
ter 3:10 bonus issue which w
the highest in the fertilizer ind
stry. The Company's gross blo
increased to Rs. 314.79 cro
from Rs. 260.35 crores and t
earning per share went up fro
Rs. 11.09 to Rs. 13.07 on incre
sed capital.

The Chief Minister was info
med that looking to the prese
indications, GSFC was expect
to do better during the curre
year. The tempo of produc
and sales had been sustained d
ring the first half of the year. T
total production of the fertilize
was substantially higher at ov
5.75 lac MT as against 3.74
MT of the corresponding perio
Similarly the sale of 1.98 lac M
of fertilizer was higher than 1.6
lac MT of the corresponding p
riod. The production and sale
industrial products such as Ca
rolactam, Nylon-6, Melamine a
Argon also registered an upwa
trend.

The Chief Minister was ha
to know that the Company
fully geared to implement
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Melamine expansion and 1350
) Ammonia plant. The Com-
y also intends to participate
the Gujarat Petrochemical
mplex at Hajira. All these pro-
ts would require a total fund-
of Rs. 1000 crores of which
outlay of Rs. 400 crores has
en earmarked for the first pha-
The Company is shortly en-
ing the share market with a
nvertible debenture right issue
Rs. 150 crores.

ATIONAL PEROXIDE

Labour unrest and glut of hy-
ogen peroxide (HP) in the open
rket have continued to affect
working of National Peroxide
versely in the current year
o.

Disclosing this at the annual
neral meeting of the company,
chairman, Mr. Neville N. Wa-
said that workers strike,
hich began in January, 1988,
ted till the first week of May
s year and normal production
HP commenced from the mid-
of June, 1988. As a result,
company produced only 700
nnes of HP till July-end and
d 260 tonnes. Sales have
en lower, mainly due to glut of
rly 1,500 tonnes of imported
in the market. It is hoped
t the company's sales will im-
ve, once the stocks of import-
HP is reduced.

Mr. Wadia added that in view
above circumstances, sales
ing the first four months of
current year are substantially
ver at Rs. 1.38 crores against
4.60 crores in the same pe-
d last year.

The company's plastics additives project is now complete and has already commenced trial runs. This project has a bright future since the demand for plastics additives has been on the rise in the country. This item is being used in the manufacture of various grades of PVC. The company will have no difficulty in selling the entire production of plastics additives. When in full production, the annual turnover of this division will be around Rs. 25 crores.

RANBAXY LABORATORIES

Ranbaxy Laboratories Ltd. has been awarded the Trishul Award of the Basic Chemicals, Pharmaceuticals and Cosmetics Export Promotion Council for the year 1986-87. The company had bagged the top award for export of drugs and pharmaceuticals in 1985-86.

Ranbaxy exports both basic drugs and pharmaceutical formulations to over 30 countries. The major markets are western Europe, south-east Asia, Far East, Gulf countries and Africa.

The company's export during 1987 accounted for Rs. 17.47 crores showing a 64 per cent rise over the previous year. Export of the company upto July in the current year amounted to Rs. 12.55 crores. The company hopes to achieve an export target of Rs. 25 crores in the current year.

Ranbaxy has been successfully operating joint ventures in Nigeria, Malaysia and Thailand with marketing tie-up and licensing arrangements for active brand promotion of its products in Cameroon, Oman, Sri Lanka and UAE.

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BERGER PAINTS

Berger Paints India Ltd., which has recommended one for one bonus issue, has reconstituted its board of directors. Mr. Biji Kurien, the chief executive of the company has been inducted in the new board as Managing Director with effect from September 1. The other new entrant is Mr. S. K. Mitra, partner of a solicitor firm in Calcutta. The board of directors led by Mr. Vijay Mallya will have two old faces: Mr. Brian P. Davis and Mr. Barry A. Tata. Those who have been dropped from the previous board include Mr. C.L. Jain, Dr. E. Beltin and Mr. H.P. Bhagat.

The board has also declared a dividend of 20 per cent for the year ending June 30, 1988. It has also recommended that the company may make a rights-public issue of 12.75 lakhs shares of Rs. 10 each, at a premium of Rs. 35 per share to augment the working capital of the company and normal capital expenditure. Berger Paints last equity issue was a similar rights-cum-public issue of 2.62 lakhs equity shares in 1975. After the bonus issues and the rights-cum-public issue have been completed, over 40 per cent of the company's paid-up capital would be out of bonus issue.

The 65-year old company, was set up initially in 1923 as Hadfield India Ltd. It changed its name to British Paints India Ltd. in 1947, when it was acquired by British Paints (Holdings) Ltd. of the UK starting with a 100 people and a sale of Rs. 25 lakhs. Berger Paints India now has 1,100 strong workforce with a turnover of Rs. 77.13 crores, from the sale of 22,000 tonnes of paints.

During the year, the Hoechst Group sold the worldwide Berger Jenson and Nicholson Group of Paint Companies to Williams Holdings PLC of the UK for a consideration in excess of £130 million. This was a strategic acquisition for Williams who already owned Crown Paints, a major solidation of Crown and Berger operations in the U.K. there will considerably strengthen Williams position in the paint industry in the UK.

Williams in turn, sold the Pacific basis interests of Berger (Australia, New Zealand, Fiji) to the ICI group. The African, Mediterranean, Middle Eastern, Asian and Far Eastern interests were acquired by the Consolidated Paints Group of the UK. The consolidated Paints group have assured Berger Paints India of technological and marketing support and have expressed a firm commitment to India.

Berger Paints India has registered a marked growth in sales turnover from 68.89 crores in 1986-87 to Rs. 77.13 crores in 1987-88. After depreciation and taxation the profit stood at Rs. 1.79 crores against previous year's 1.92 crores. Including surplus brought forward, profit available for disposal stood at Rs. 2.56 crores, against Rs. 2.90 crores in 1986-87.

An amount of Rs. 13,622,820 being part of the undistributed profits will be used for paying 1,362,282 ordinary shares of Rs. 10 each to be allotted as fully paid bonus shares.

The board proposed 1,275,436 new shares of Rs. 10 each to be offered for subscription for cash at a premium of Rs. 35 per share in the following manner: (1) 272,456 ordinary shares to existing members in the ratio one new ordinary share for eve 10 existing ordinary shares he by the members whose nam appear in the register of membe of the company on such date may be determined by the boar (2) 63. 772 ordinary shares offered for subscription to e ployees of the company., (127,544 ordinary shares will offered for subscription to t various business associates the company who are resident dians and (4) 811,664 ordina shares will be offered for sub cription to members of public

COLOUR-CHEM LTD.

Mr. B. M. Ghia, Chairman, C lour-Chem Ltd., told the shareh ders in Bombay recently that t company's output of textile a leather auxiliaries had to be c tailed in the recent months d to non-availability of acrylic n nomers and due to high prices a few other essential inputs.

Because of this, the compan operations during April-July 19 have been under pressure alt ugh a marginal increase in sa was achieved as compared to les achieved in the same peri of last year.

Mr. Ghia said that profits dyestuff manufacturers in organised sector continued to main slim due to unfair comp tion from excise-exempted out by the small scale sector.

The recent decision of the g ernment to reduce the all-indus rate of duty drawback to 5 cent from 10 per cent would ther erode the already uneco mic return on the capital emp ed in the dyestuff industry would be a severe blow to port effort, he added.

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New Plants & Products

ECYCLING PLANT FOR MING CATALYSTS

spring of 1988, Degussa AG kfurt am Main put a new g plant for spent forming cat om mineral oil refineries into n at its metal works in Wolfgang, West Germany. mplex recycling process for overy of the precious metals ed in the catalysts, in partic- platinum, has been applied ompany since 1960. Numer- tailed improvements have ed results and capacity has en expanded to 80 metric per month.

The plant and safety equipment are to a large extent process-controlled. The concentrated caustic soda solution used during recycling makes extensive labour and environmental protection measures necessary. No waste fluid is produced by the process: the resulting aluminata liquor is used in the aluminium industry for further processing. Energy is supplied mainly in the form of steam, generated at the plant by the incineration of photographic paper and film, for example, which pass through another section for the recovery of silver.

The recycling process consists basically of three phases. Firstly, samples of the catalyst are examined to determine the precise precious metal contents, so that the customer's account can be based on accurate analytical data. The second phase involves processing of the catalyst, during which the accompanying substances – mainly aluminium oxide and various impurities – are separated off. In the third phase, the accumulated precious metal is separated and purified to a quality suitable for the production of new catalysts or other products.

During the pre-treatment, the material is weighed accurately and

autoclaves in the new recycling plant for spent reforming catalysts at Degussa's metal works in Hanau-Wolfgang then screened to separate the main catalyst fraction from dust containing a high level of precious metals and coarse particles with no precious-metal content. The exact precious-metal contents of the samples which remain after the homogenisation are then determined in an analytical process.

In the second phase -- the recycling - any carbon which may be present is removed from the catalyst by burning up. The spent catalyst is treated with caustic soda solution at a pressure of approximately 10 bar and a temperature of approximately 200°C. Under these conditions the base material -- alumina -- is converted into sodium aluminate, which is decanted from the residual matter. These residues contain the platinum and, in some cases, iridium as well. The platinum metals are dissolved in hydrochloric acid with chlorine and then delivered up as solution to the platinum refinery for further processing.

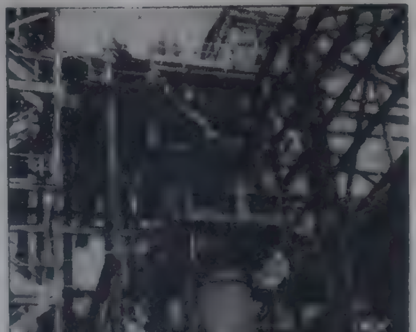
The platinum purification up to 99.95% minimum is one of the most difficult tasks in inorganic chemistry. The main problem is that the applied separating procedures are not quantitative, so that traces of the platinum metals remain in the mother liquors, remained after each crystallization process. As a result, all the mother liquors must also be recycled in order to achieve satisfactory overall yields.

Reforming catalysts are used by the petrochemical industry in mineral oil refining processes. Natural mineral oils contain little or none of the anti-knock benzene which is required, for example, in high-quality fuels with high octane numbers. In the reforming process, the basis principle of which has been applied on a large technical scale since the end of the nineteen-forties, highly knock-resistant hydrocarbons are produced. The catalysts used in the process are small compacts or other shaped pieces of alumina, coated in most cases with platinum. When the catalyst loses its effectiveness after several years, it must be renewed.

The 25,000-metric ton total mass of catalysts used by approximately 500 reforming plant operators throughout the world contain about 95 metric tons of platinum and 1.5 metric tons of iridium. Approximately 4,000 metric tons of spent catalysts are available for recycling every year. Depending on the quality of the catalysts, the recovery rate at Degussa ranges from 97 to 99% of the platinum content determined by sample analysis. The fact that only 1% of the yearly world's platinum production goes into the petrochemical industry indicates how complete the platinum cycle is in this particular area.

HIGH-PRESSURE STEAM SUPERHEATER IMPROVES ECONOMIC PERFORMANCE OF AMMONIA PRODUCTION PROCESS

The high-pressure steam superheater developed by Sulzer has proved to be extremely useful in the large scale production of ammonia.



Assembly of the superheater

Such a superheater, installed in a 1000 tonnes per day production plant in Canada, has been in operation since 1983, often at 120% of the design rating. On account of this good result, the production plant has now been supplied with an additional heat exchanger bundle. Moreover, during the next standstill, Sulzer is to carry out a residual life analysis on the first superheater bundle.

Ammonia is produced in large single-line plants (500 to 1500 tonnes per day). Costs of the feedstock materials required for the production, e.g. natural gas, are continually rising, hence the trend to develop new plants with higher efficiencies. Such plants require a superheater between the secondary reformer and the high-temperature CO converter. The high-pressure steam superheater consists essentially of many parallel, helical-line tubes and a two-part pressure casing. It cools the gases flowing out of the secondary reformer from 705°C to 371°C at 34 bar inlet pressure. The steam temperatures are 328°C at the inlet (125 bar inlet pressure) and 451°C at the outlet. The amount of thermal energy recovered is such that a significant reduction of the operating costs is obtained.

Further information can be had from Sulzer, CH-8401, Winterthur, Switzerland.

ESCHER WYSS FLUID-BED DRIER WITH IMPROVED ECONOMIC PERFORMANCE AND FLUID-BED TECHNOLOGY

Sulzer Escher Wyss, Zurich and Ravensburg, have made an important contribution to improving the economics of drying processes by further development of the fluid-bed drier. The new drying procedure allows the transfer of large quantities of heat even at low temperatures and using the smallest possible quantities of carrier gas. Moreover, and practically as loss-free exchange reaction, it allows the operation of closed systems using the evaporated product vapour as fluidizing gas. In addition to the absolute minimalization of the heat consumption, the inert and emission-free nature of the operating mode is further evidence of its exceptional value. Moreover, almost the whole of the energy used for the drying can be utilized further as waste steam.

In order to make this system widely applicable, further developments have been made in the granulation and structurizing of product forms not immediately fluidizable, such as sludges, pastes, suspensions and filter cakes.

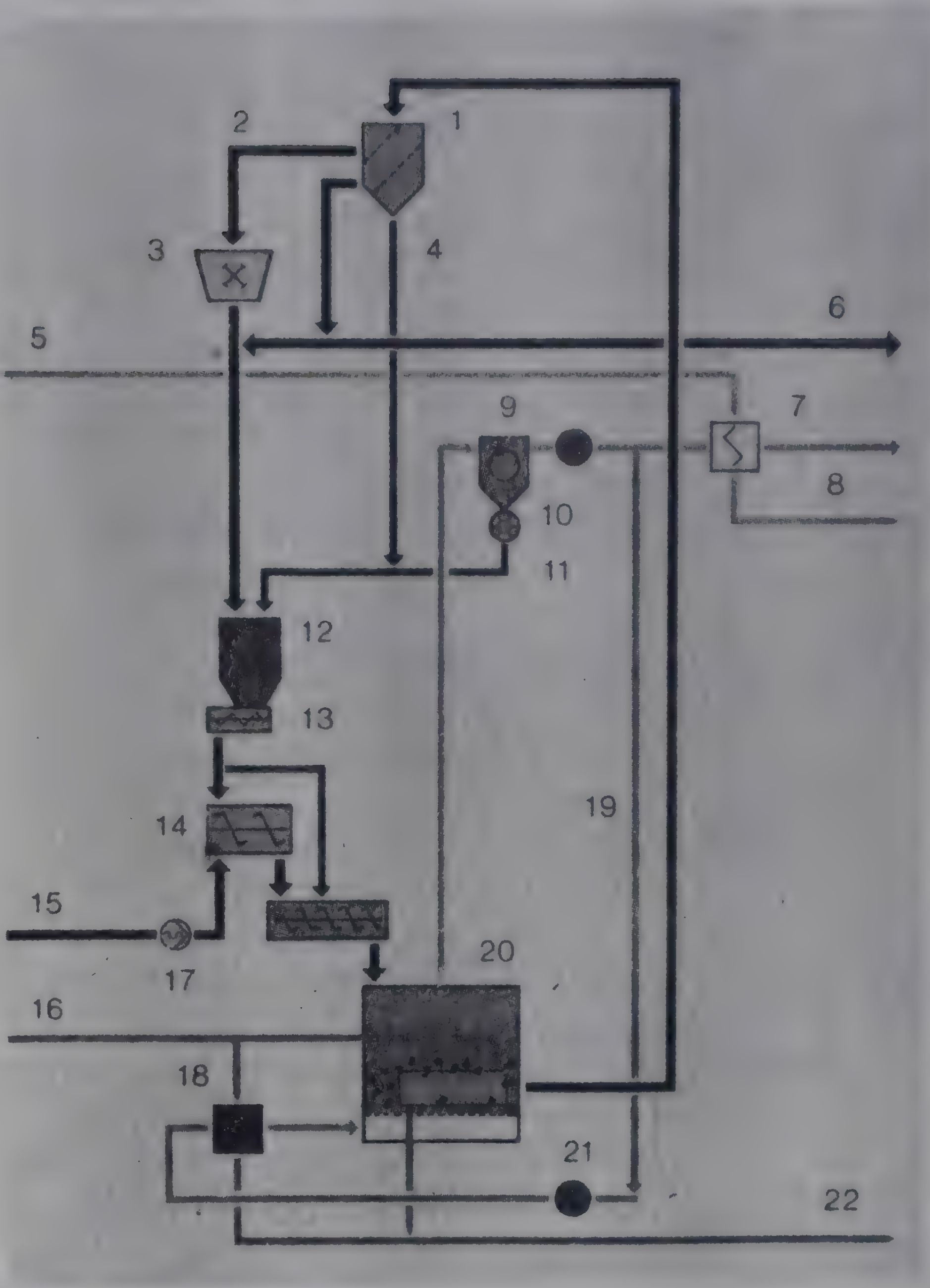
Fluid-bed driers achieve transfer of the heat or material required for drying substances in bulk by enforced convection. This is the most frequent functional principle also for drum-, flash- and spray-driers. All variants have nevertheless to take nto account the fact that the drying s, as a rule, accomplished at the price of more or less high losses by convection.

Further details can be had from Sulzer-Escher Wyss AG, Postfach, H-8023, Zurich, Switzerland.

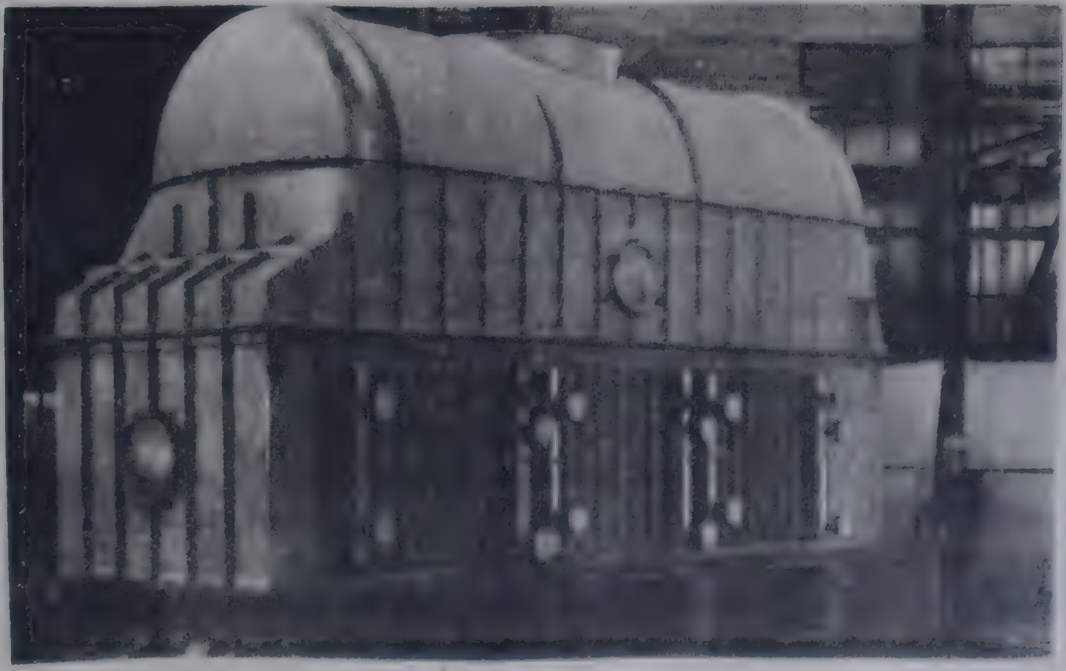
VATER-COOLED GAS OMPRESSOR OF TRUNK-ISTON DESIGN

Sulzer-Burckhardt, Basle, has ecently published a six-page folder rochure entitled "CT -- The trendetting, water-cooled gas compresor of trunk-piston design".

The brochure commences by escribing the special features and pical application areas of these mpressors (suction capacity 270-30 m^3/h, discharge pressure 25 to



Granulation of paste products and drying of same using heat-exchanger fluid-bed equipment in a closed gas circuit.
(1) Screen, (2) Oversize, (3) Grinder, (4) Undersize, (5) Cooling Media, (6) Final Product, (7) Condenser, (8) Condensate, (9) Cyclone, (10) Rotary Valve, (11) Dust, (12) Silo, (13) Metering, (14) Granulator, (15) Paste, (16) Steam, (17) Metering, (18) Heat Exchanger, (19) Gas Loop, (20) Fluidbed Drier, (21) Fan, (22) Condensate.



Fluid-bed equipment

300 bar, power input ca. 40 to 130 kW). Information concerning design and materials is provided, as well as details of standard scope of supply, options and instrumentation. Finally, production, quality assurance, research and development, testing and customer support service are briefly outlined.

The brochure is available, free of charge, from: Sulzer-Burckhardt, Engineering Works Ltd., Dornacherstrasse 210, CH-4002, Basle, Switzerland.

LOW TEMPERATURE DRYING SYSTEMS

For products which are temperature sensitive, drying at high temperature deteriorates their quality. In such instances, the solution lies in surrounding the product with dry air without the risk of product spoilage. Bry-Air specializes in such types of low temperature drying at temperature below 75°F. Bry-Air dehumidifiers speed up product drying by continuously removing moisture from the surrounding air by a process of physical adsorption where the adsorbent used is a desiccant. Bry-Air units are custom designed for specific requirements. They are available in different models with different drying capacities.

Bry-Air dehumidifiers find applications in various industries where low temperature drying is required like drying of cocoa, gelatine, yeast, coffee powder, flour, starches, katha, onions, in processing powdery foods like soft drink concentrates, milk powder, sugar, in packaging and storage of biscuits, wafers, snacks and in breweries and distilleries where mold and mildew formation is prevented in hop storages, yeast rooms, fermentation and kegging areas.

The most advanced technology of desiccant dehumidification has been brought to India by Bry-Air India Pvt. Ltd. a joint venture with Bry-Air Inc. U.S.A. Other products from Bry-Air are Plastic Dryers, Heat Recovery System, Mold dehumidification systems, Seed Dryers, Wood dryers, etc.

For more details contact: Arctic India Sales, 20, Rajpur Road, Delhi 110 054.

Low Temperature Drying Systems

ARTIFICIAL LIMBS WITH CARBON FIBRE BONES

An epoxy resin from Shell Chem icals UK is the basis of a new typ of artificial limb. Marketed by J.E Hanger & Co. Ltd. of Roehampto it has been tested and approved b the Department of Health and is no being issued internationally.

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The new carbon-fibre composit says Mr. McQuirk, the prosthetic manager of J.E. Hanger, is the 'ide material', and has the added bonu that the pultrusion process used t make the 'bones' (or tubes) is ve accurate. The pultruded lengths a made by Pultrex, whose busines was acquired last year by Fibrefor Composites -- a Shell UK subsidiar

The challenging markets for th limbs are the USA and Japan (Ja anese Government approval ha already been given), but the limb are also being marketed througho Europe, particularly in Scandinavi

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ALTERNATIVES TO CONVENTIONAL CURING AND HANDLING OF RAW HIDES AND SKINS*

CATHERINE A. MONEY
CSIRO, Division of Protein Chemistry, Australia

NTRODUCTION

In many countries, conventional stack curing is being eplaced by either green processing of unsalted hides and skins or by alternative salting methods. A great benefit for the countries which produce hides and skins is hat they can reduce preservation costs and the salinity problem in effluent. In the U.S.A., Australia, New Zeaand and some other countries, increasing numbers of hides and skins are being converted to some form of part-processed stock at or near their source. For raw material which must be preserved for a longer period before processing, salt is still the best preservative. The more efficient modern curing methods require different handling techniques to those used for stack salting.

Green processing and efficient salting methods are only worthwhile if leather quality is maintained or mproved. Shortterm preservation is often necessary to prevent deterioration of hides and skins before they are alted, dried, part-processed or tanned.

Green Fleshing

Green fleshing has had a major effect on handling of ides and has resulted in through-processing to wetlue in one drum and better quality tallow and meat meal roduced from fleshings. When hides are fleshed before alting, a better, more even cure is achieved.

Hides are delivered to the fleshing machine from the ll floor directly by conveyor or, more commonly, in bins. odern handling techniques and machines enable hides be put on to hooks at floor level, then to be autoatically weighed, sorted into weight ranges, conveyed a raised, through-feed flesher and directed into difrent bins as they fall down a chute after fleshing. The des are cooled during the process. The fleshings can dewatered over a vibrating wedge-wire screen, colcted in bins and rendered without delay. The total opetion requires only five workers to flesh 300 hides per ur.

Green Processing

Although green processing is mainly associated with wet-blue production, it is also being used in Australia and New Zealand for sheep and lambskins. These skins are either tanned as woolskins or fellmongered to produce both wool and pelts, which are marketed as pickled-pelts.

All types of skins can be processed without salting but problems to be overcome are:

1. Uncertainty of delivery times : Additional shifts or short-term preservation are sometimes needed.
2. Seasonality : During peak supply periods stock can be held in a part-processed form until there is a reduced supply of raw material. In New Zealand fellmongeries close in the off-season.
3. Complications when it is necessary to process the total output of a meatworks, irrespective of weights and grades: It is an advantage if meatworks will sort stock for different customers but otherwise a processing plant can sort at fleshing and process in different weight ranges.
4. Distance between the source of raw material and the processing plant: In some cases new plants have been built, in others, short-term preservation is used during transport.

These disadvantages are often outweighed by the advantages of eliminating the cost of salting, reducing the salinity of efluent, reducing soak times, obtaining green fleshings and improving leather quality.

Short-term Preservation

Short-term preservation was investigated in India nearly 30 years ago (1) and when it was first studied in Australia a zinc chloride treatment developed by George and Krishnamurthy (2) was tested (3) and since then zinc chloride has become one of the recommended treatments (4) used by the Australian industry.

Chemical methods and chilling are now used in Australia mainly to facilitate green processing at wet

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Paper presented at the 23rd Tanners Get-Together on the theme Modernisation of Leather Industry" held in January 1988 at Cenral Leather Research Institute, Madras.

blue plants. The methods in use are all cheaper than salting. Hides are preserved during transportation, over weekends and holidays, in emergencies and when time is needed to build up production packs. Often, preservation is only required for overnight protection and chemical methods are rarely used for more than three day's storage.

The chemical methods are based on the use of either sodium chlorite, calcium hypochlorite, zinc chloride or benzalkonium chloride and are used to preserve hides for upto 6 days at 25°C (Table 1). Addition of fungicides is necessary for storage times greater than three days but chlorinated phenols are not recommended if fleshings or other by-products are to be utilized. Chemical treatments can produce hair loosening due to the action of autolytic enzymes present in the skin (5) and are therefore not always suitable for preservation prior to salting or for tanning of woolskins. Sodium chlorite and benzalkonium chloride can be used for the storage of woolskins for upto 3 days whilst zinc chloride and formaldehyde, which both inhibit enzyme action, can be used for upto 6 day's preservation. Formaldehyde has a tanning action which tightens the wool so it is not suitable if hair or wool are to be removed. Calcium hypochlorite discolours wool.

TABLE-I

RECOMMENDED DRUM AND SOAK TREATMENTS--HIDES, CALF, GOAT AND KANGAROO SKINS

	% Preservative (kg/100 kg. hide)			
Maximum number of days' storage at 25°C	**Imprapell**	**Zinc chloride**	**Calcium hypochlorite**	**Benzalkonium chloride (50% BAC)**
1	0.2	0.1	0.1	0.1
3	0.5	0.3	0.3	0.3
6	1.0	0.5	0.6	--
Fungicide				
BAC (50%)	--	0.1	0.1	--
Panacide (dichlorophen	0.05	--	or 0.05	--
Sodium trichlorphenate	or 0.1	or 0.1	or 0.1	

	Drum	Soak	
% Float (water)	20-50	100	400
Time	2 hours	≥ 16 hours	Store in liquor
Agitation	≤ 10 r.p.m.	Preferable	Preferable

Drum soak and spray methods have been used but drumming is preferred by industry. Soaking can be carried out in the bins used for transporting hides.

Occasionally short-term preservation has not bee adequate and there has been some damage to th resultant leather. Usually either there has been a dela before treatment, the temperature has been too high o insufficient chemical has been added. Small scale trial should be carried out at individual works before production runs are undertaken. The recommended treatment for short-term preservation can be used for soaking o dried or salted hides and skins to control bacteria growth.

There is now an enormous literature covering chemical short-term preservation and many treatments hav been recommended. Some of these have been compared in the CSIRO laboratory with the methods alread in use in Australia. No alternative method has yet bee tested which is more acceptable when degree of preservation, cost, environment and leather quality are a considered. New preservatives are being develope including possible alternatives to chlorine as broad spectrum disinfectants (6) and some of these may be sui able for hides and skins (7). Any new, acceptabl chemicals should be tested for preservation potentia

Chilling has been used for many years in Australia mainly to hold hides before transport to centralised brining plants but increasingly before green processing. Th temperature to which hides and skins should be chille depends on the required time of preservation. When chi ling occurs immediately after removal, hides and skin can be kept for 3 weeks at 0°C, 2 weeks at 5°C, 1 wee at 10°C, 2 days at 15°C, 1 day at 20°C and less tha one day at 25°C. If there is a delay before chilling or slow rate of chilling, the storage time at a particular temperature is reduced. Various chilling methods can b used provided all areas of all hides and skins reach th required temperature. These includes:

-- spray or bath washing with chilled water
-- crushed ice e.g. added to collection bins
-- dry ice particles (carbon dioxide snow)
-- rapid chilling in a freezer
-- hooks on a conveyor in a chiller. The chiller can b mobile.

The flesh side of skins can partially dry out during ch ling and if these skins are subsequently salted, salt penetration problems can occur. Moistening the skins befor salting will allow rapid penetration of salt.

A chilling plant has recently started operating in M bourne, preparing hides for trucking 750 kilometers a wet-blue plant. Hides are hung on hooks on a co tinuous chain which firstly takes them through a h pressure washer, then through a chiller which chills them to 5°C in 48 minutes while they drain. Finally they are conveyed out from the hooks. As the hides fall into a crate, two men fold them with the hair-side out. When 35 hides are packed into a crate it is taken to the chiller. Four workers, with a rotating forklift, can process 300 hides per hour. Before transportation, hides from two crates are combined to give 70 hides in an extended crate. Each crate is covered with plastic and a truck-load is covered with a tarpaulin. The hides are being transported to 750 kilometres in 12 hours and the temperature of the outside hides rises only 2-5°C, even in warm weather. Hides are being kept upto 10 days prior to transport and a further 24 hours at the tannery before fleshing and green processing. In future, the hides may be fleshed before packing to reduce weight, and hence transport costs, and to reduce the amount of handling necessary. Fleshed hides could be emptied directly into the tanning drums from the bins. The chilled hides flesh extremely well.

The total cost per hide is less than 40% of salting costs and the hides do not need a soak. The operation is justified by the cost savings and improved wet-blue quality without effluent consideration. Effluent salinity is not a problem at either the point of chilling or processing due to coastal location. For inland areas where salinity is a problem, such a chilling system would have additional benefits.

Comparison between Chilling and Chemical Methods

The main advantages of chemical methods are:

1. The continuing protection given during transportation and delays.
2. The ease of application, especially in tanning drums or converted concrete mixers.
3. Treatments using either sodium chlorite or calcium hypochlorite alone do not affect byproducts or effluent.

The disadvantages of chemical methods are:

1. They are not recommended when temperatures are continuously above 30°C.
2. All the chemicals need to be handled with care although some are more hazardous than others.
3. Some of the chemicals cannot be used in particular circumstances due to effluent restrictions or contamination of byproducts.
4. Loosening of hair or wool can occur within 2 days at 25°C, as already mentioned.

The main advantages of chilling are:

1. Meatworks have expertise in refrigeration and sometimes there are facilities for chilling available.
2. No pollution.
3. No contamination of byproducts.
4. Suitable for all hides and skins.
5. No hair-loosening. Chilling is therefore suitable for wool skins and hides which will subsequently be cured or tanned with the wool or hair on.

The main disadvantages of chilling are:

1. Hides and skins are good insulators and retain the body heat so they should be chilled individually, immediately after removal.
2. Damage can occur if low temperature are not maintained during transport.

A COMPARISON OF CURING METHODS

Brining in raceways, or drums, and drum salting with no added water are labour-saving alternatives to conventional stack salting which are now widely used in Australia. Brining is the most common method used for hides but is not suitable for calf or sheep skins because they are more susceptible to damage than hides and continual re-use of brine allows build up of contaminants and bacteria, even when additives are used. Drum salting is the major method for sheep, calf, goat and kangaroo skins. Until recently customers preferred brined to drum salted cattle and buffalo hides but dry drumming is a simpler process and some companies are now successfully marketing drum salted hides overseas. If care is taken, all curing methods give good results.

In both brining and drum salting the temperature should be kept below 30°C (preferably below 25°C), to prevent "brine draw" and dispersion of fat. Tanners must ensure that their soaking process results in complete rehydration of brine and drum cured hides and an alkaline soak (e.g. 1% sodium carbonate) may sometimes be necessary to overcome brine draw.

During any method of salting, sodium chloride penetrates the hide, some protein is removed and water is released as brine. The water remaining in the hide should be almost saturated with salt. Sufficient salt must be available to all areas of the flesh side of the hide for sufficient time to achieve the required salt uptake. For 'stack' salting, the weight of salt should be approximately one third of the hide weight, but less salt, approximately 20% of hide weight, is required for drum and brine curing as there is less wastage. It is not necessary to wash hides or skins before salting but if hides are prewashed, more salt is necessary to achieve the required saturation levels.

Weight of Salted Hides

The weight of a cured hide depends on the salt and moisture content and the amount of flesh, dung and salt adhering to the hide. A cured hide, free of excess salt, weighs less than a green hide. By controlling the brine concentration or the amount of salt offered, hides of similar weight can be produced by both brining and drum salting. However it should be remembered that the higher the ratio of salt to moisture in a hide, the lower the risk of deterioration. The sale of hides by weight unfortunately encourages sale of hides with too much water and the result is unsatisfactory preservation.

Degree of Cure

It is generally accepted that a cured hide should contain less than 50% moisture and this moisture should be at least 85% saturated with salt, giving an ash-to-moisture ratio in the hide of about 30:100 (30%). In the presence of effective salt additives, an ash-to-moisture ratio of 27-29% does not necessarily indicate inadequate preservation, particularly if analysed immediately after curing, but the aim in curing should be for high salt levels.

Effluent

All salting methods produce a brine effluent and a 25 kg hide produces about 5 litres of brine. It has often been thought that brine curing does not result in brine effluent, but when brine is regenerated and reused in either a raceway or a drum, considerable volumes of excess brine are formed.

Salt Additives

The use of additional preservatives is strongly recommended for all salting methods. Additives improve the preservation of hides and are essential to prevent woolslip in sheep skins. The bacteria that cause the red discolouration known as "red heat" may not themselves cause hide damage, but hides cured without added preservatives can be contaminated with other bacteria which do cause damage, e.g. hair slip in hides and grain damage in resultant leather. If salted hides are to be kept for only a few weeks at less than 20°C [illegible]

[illegible]

sive stoved (heat sterilised) salts. Initia
preservatives, and subsequent re-curing
tives, is not recommended.

For drum or stack salting, 1% sodium
naphthalene plus 1% boric acid, calcul
tages of the weight of salt used, are pres
have been used successfully for hides
kangaroo skins. Several other combinati
are recommended for sheep skins (see
Sodium fluoride is better than naphtha
acid for preservation at high temperat
Naphthalene is volatile and salts contai
should not be stored for long periods, es
conditions. Sodium fluoride (NaF) is a po
lation and skin or eye contact may cau
should be avoided by the use of pr
equipment.

For brine curing the addition of sodium
ommended, and a minimum amount e
hide weight is required. Higher levels o
better preservation and control of red

With salts of high calcium or magnesi
0.05%, i.e. 500 p.p.m.), sodium fluor
insoluble, inactive calcium and magnesi
additional fluoride is necessary to c
growth.

Automated Salting

Salting can be automated, e.g. calfsk
on conveyor belts using an automate
immediately folded and packed for sh

Brine Curing

Australian hides are being brined in
processors, mixers and drums. The br
indefinitely and are continuously scr
wedge wire screens, to remove solids
ated by passing through a lixator (a tall o
The brine should always be above 9
(30% saturated), the higher the bette
screens remove hair and larger solids
sediment, which could be removed by
ling tank for sedimentation before the

[illegible]

should be agitated in the brine for r to achieve a satisfactory level of s of 16 hours are common but the the system used, the degree of satand the thickness of the hides. The a particular plant can be determined to moisture content of the thickest fter a range of agitation times. In oat of approximately 500% (i.e. hide ht) is used and a tank with a capaccan hold approximately 500 hides. with paddles to keep the hides ciriers or drums are used for brining, % float is used and it is therefore ously recirculate the brines through id salt to provide the hides with suf-

are usually drained on a conveyor ium fluoride has been successfully itive in Australia for over 10 years. level of 0.3% NaF on hide weight sent Australian requirements but lly, to give a base level in the brine. uses if there is calcium and magome works have had problems with the system when they use salts nd magnesium contents.

st chlorinated phenols have been de preservatives, due to their toxbe used, especially when byprohuman or animal consumption, e.g. casings, dog chews.

b and cattle hides and all types of with salt in wooden drums, steel or ssors or mixers, or stainless steel aximately one hour (skins) or 4-7 e will depend on the hide thicking action, which is less efficient a. Optimum conditions should be ticular system.

eed is less than 5 r.p.m. but higher ed for sheep, goat and calf skins er speeds can lead to heat build ly and are not recommended for onger drumming times. Concrete orked in various ways, including painting the base [illegible] using a and sandblasting [illegible]

which could damage the skins. Drum salting causes abrasion of drum linings.

The number of skins or hides in a load depends on various factors. A butter churn can hold upto 300 lambskins and an 8 cubic metre mixer can cure 4 tonnes of hide in 4 hours at 4 r.p.m. Hides and skins are loaded either manually, by conveyor systems or using fork lifts to empty bins into drums. Unloading varies for different types of drums. A tray on a fork lift is used to unload butter churns while they are rotating, drums can be emptied through a door into bins and the reverse action of mixers is used to feed out skins.

Salt is usually of medium grain size for hides but sometimes stoved, fine salt is used for sheepskins. Approximately 25% salt, based on green weight, is commonly used although more is necessary if skins are washed before salting. The recommended additives can be premixed with the salt or rotated with the salt before the hides or skins are added.

Salt additives are even more important for skins than they are for hides and they are essential for lamb and sheep skins. The additives used for lamb and sheep skin are 1% zinc chloride plus 1% sodium fluoride, 1% zinc oxide plus 1% boric acid plus 1% sodium metabisulphite, 1% naphthalene plus 1% boric acid (this causes pink discolouration in New Zealand where skins are washed before salting), or 1% sodium fluoride plus 1% boric acid.

After salting, hides and skins are usually allowed to drain for a few days before packing. If hides are laid flat, rather than bundled in a bin, they are easier to fold after draining.

Storage and Transport of Salted Stock

If there is insufficient salt in hides and skins or no additives present, hair slip and a bad odour may develop during storage. The storage life of well salted hides and skins depends on storage temperature, humidity and the salt additives used.

Hide stores should be well ventilated and designed to keep skins as cool as possible. Very high temperatures of 55°C or 60°C damage well salted stock because the hide structure changes from collagen to gelatin. There is no smell or hair slip but the damage becomes obvious during processing. Dry salted hides and skins are [illegible] after curing [illegible] temperature storage. They are then [illegible] [illegible]

Drying

Large numbers of Australian sheep skins are air dried but drum salting is becoming the preferred method of preservation because it is quick and uses less labour. Drying overcomes salt effluent problems and uses solar and wind energy. If skins were fleshed prior to drying, the problems associated with drying would be reduced.

OTHER PRESERVATION METHODS

Gamma and electron beam irradiation (8) of hides may be suitable in some circumstances but will require large capital investment.

Freezing is expensive and it is difficult to thaw frozen stock without any deterioration occurring.

CONCLUSION

Although there still appears to be a need for an alternative to salt for preservation, the best alternative at present is to make changes to facilitate green processing. After all, salting is often not necessary, only a cor venience which often causes problems.

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LEATHER ABSTRACTS

ICREASING OPERATING EFFICIENCY, J.H. Haberelal, *American Shoe Making,* **362** (4) 50, 1988.

This article examines the chances of fulfilling demands r greater 'Operating efficiency'. The question whether is demand is at all appropriate in view of the current erformance level of the Central European Shoe Indus-y is purposely left open. The primary aim is to search r procedures for increasing plant performance.

IAN MADE ALTERNATIVES TO LEATHER, R. Turner, *hoe & Leather News.,* CCCLXXI, 3760, 14, 1988.

It is generally agreed that by the year 2000 there will e insufficient leather available to satisfy world footwear roduction requirements. This is due mainly to the stead-y rising world population coupled with more countries eeking to develop their economies. This means that ynthetic or man-made upper materials are likely to be ore important and this paper looks at current devel-oments in synthetic materials.

HE STUDY OF PHYSICAL TESTING OF LEATHERS, Lange, *Das Leder,* **39,** 81, 1988.

This paper describes to which level the physical ather test methods have developed. In this first series reports the problems of climatisation and of taking amples, the agency methods for leather and finishing, e determination of stability of leather furnishing, the etermination of reaction to water when put under namical stress in the penetrometer and finally a test continuing tearing are discussed.

EPSIN SOLUBLE COLLAGEN FROM KANGAROO N, L.J. Stephons, J.A. Werkmeister, J.M. Caire and A.M. Ramshaw, *Das Leder,* **3a,** (5) 88, 1988.

Collagen from Kangaroo skin was solubilised using psin digestion and purified by NaCl precipitation. The eparation gave type I and type V Collagens which re compared with the equivalent bovine Collagen by no acid analysis, by examination of cyanogen bro-de fragment sizes and by melting temperature deter-nations. This suggested that brovine and Kangaroo ollagens were significantly different, whereas the type Collagens were very similar.

There was no evidence for any trypsin soluble type III collagen with Kangaroo preparation.

THE PROPERTIES OF WET BLUE, W-Luck, H. Rosentreter and B. Wehling, *Das Leder,* **39** (4), 61, 1988.

The content of inorganic cations and anions as well as the COD value of aqueous extracts of commercial wet-blues from various sources was determined. This work was carried out in view of the effluent problems facing tanneries processing wet blues. Large differences were found between wet blues of different origin. Hence the influence of the deliming and pickling process and of various types of chrome tannages was examined by way of matched sides trials. Furthermore, changes in the wet blues during an extended storage period (i.e. 1 year) were studied. For this purpose, the content of bleachable chrome, the acidity and the proneness to mould formation on the leathers are checked. The influence of different tanning processes in this respect was examined and it was observed that in the mould affected areas distinct increase of the pH-value are found. This phenomenon can occur even before any mould becomes visible on the surface of the leather. Uneven dyeings can be the result. By way of matched sides trials, it is shown that this increase of the pH is always liable to happen when formates are used in the tanning process.

IS RESIDUAL LIQUOR WITH ONE MILLIGRAM OF CHROMEOXIDE ATTAINABLE? Kh. Fuchs. *Das Leder,* **3,** (2), 31, 1988.

Chrome pollution of waste water from the tannery is increasingly becoming the number one ecological problem factor for the tanner. In this paper, a new, high exhaustion process is introduced which, at a chromic oxide concentration of 1% calculated on pelt weight, supplies leather of excellent quality.

CHROME RETANNING OF WET BLUE LEATHER WITH HIGH DRAINING, B. Wehpingi H. Rosentreter, *Kozaiobuca,* **37,** 49, 1988.

This paper describes the advantages of retanning with synthetic chrome agents. This enables high draining of chrome in retanning process so that little chrome enters to waste waters. At the same time the leathers are subjected to retanning and to neutralisation.

NEW WAYS TO MAKE LEATHER WATER RESISTANT, B. Higham, *World Leather,* **1** (1), 27, 1988.

Water repellancy is a property desirable in many leathers nowadays and one need not make leather before making it water resistant. Treatments can be applied in the drum and resultant leather can often be dry cleaned without impairing its properties. In this paper, the author looks at recent developments in Germany.

MICROBIAL INSPECTION OF LEATHER AND ITS CONTROL, H. Gattner, W. Linder and H.U. Neuber. *Das Leder,* **39** (4) 66, 1988.

Some new aspects of preservation of Leather with modern fungicides in tanneries are presented. The advantages of combination of active fungicides for the protection of wet blues are stressed especially. Practical hints for severe inhibition of moulds on wet-blue are given, taking into consideration the special partition properties of octylisothiazolinone, methoxy carbonylamino-benzimidazole and thiocyanato methyl thio-benzothiazole. The analysis of the heterocycles on wet blue is performed by HPLC.

THE PRODUCTION OF SOLUBLE PROTEINS FROM WOOL WASTES, H.H. Mies and H. Zahu. *Das Leder,* **39,** (4), 73, 1988.

Black wool parts are produced with the aid of a sulphuric treatment during the carbonising of wool with parts of plants as well as during the following teasel process. These parts cannot be used for textile purposes. As this material consists of 70-75% wool fibre waste and wool of fibre proteins, it was investigated how to gain soluble wool proteins by reductive extraction in such a way that would allow cosmetic application. The reduction and conversion with iodine acetate produced carbo-methylated wool proteins with an average weight of 50,000 with a produce of 45%. If one adds cystine to the protein extract, the produce raises to 65%. The cystine remnants of the wool proteins formed mixed disulphides with the cystine. This cystine enriched product could be used as a starting material for cosmetics.

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NEW PRODUCTS & PROCESSES

NEW PRODUCTS FROM BASF

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Astacin systin ACR is a novel reactive top coating process. It displays substantially better range of properties than other systems, especially with regard to wet rub resistance, resistance to scratching, high temperature stability flex resistance and light fastness. Corial Matt Lacquer CM, Corial Lustre CE and Corial Diluent EB an inert solvent are used together with the three products described below in this new system.

Astacin Finish RA is an acrylic polymer dispersion ontaining reactive groups, manufactured by solution olymerisation. Astacin FX RB is a solution of a polyunction organic compound. Astacin soft RC is an xtremely low volatile plasticizer consisting of a special rganic ester.

Eutresol Hardener FC enables finishes with very high ater repellency to be produced. Optimum water repelncy can be achieved by operating continuous plating achines at temperatures of 170°C and above. There no danger of plated finishes becoming brittle.

Corial Microbinder BM is a new type of highly water sistant binder. The finely divided dispersion forms a ugh, scarcely tacky finishing film. When used in comnation with Corial Microbinder AM, the new product ves finishes suitable for soft leathers with interesting ndle properties.

PORTABLE METER

The KM 1205 is a battery powered (or mains if quired) instrument which can measure and print pH, nperature and millivolts. Accurate printed records can taken to back up research and reports.

It is a portable, digital measuring printer for pH, and features automatic temperature compensation and electrode standardisation to NBS buffers 4.0, 7.0 and 9.2 whilst allowing temperature of buffer solutions to vary from 0-40°C. The instrument features a date/time clock which automatically prints day, month and year.

Leather, **190**, (4557), 1988.

CHINA — NEW SOURCE OF WET SALTED HIDE

A 'new source' of wet salted hides is People's Republic of China which has started trading with Italy. Until last year, buying was canalised through Beijing but now each province is responsible for its own business.

World Leather, **1**, (5), 1988.

NEW CHROME USE TANNING FROM ICI

ICI has introduced a new patented product to replace chrome, totally or partially, in tanning leather in what they describe as the biggest breakthrough in tanning for 100 years.

Synektan TAC, the new product, is based on the use of aluminium, titanium and magnesium researched and perfected by ICI Colours and Fine Chemicals at its Leather Centre at St. Clair Du Rhone, France. It is claimed to reduce the use of chemicals requested for wet processing by upto 50% and similarly reduces the use of water and produces water effluent which is toxic free and environmentally acceptable. Synektan TAC will be available world-wide from September 1988.

World Leather, (5), 1988.

ACQUEOUS UPHOLSTERY FINISHING

A new acqueous polyurethene finish which meets the demand for upholstery leather has been developed by Earnshaw Ltd. It will withstand 300 wet rubs and 1,000 dry rubs on the Veslic, 1,00,000 flexes as the Bally flexing machine and also exhibits good adhesion properties. The new system utilises a cross linking agent which improves the physical properties after 24 to 48 hours.

World Leather, **1**, (5), 1988.

INDIAN LEATHER SCENE

INDUSTRY PERTURBED OVER MOVE TO BAN EXPORTS OF SEMI-PROCESSED LEATHER

The Government policy to totally ban export of semi-processed leather from April 1, 1990, is causing worry to the industry and trade.

As a first step, the Government has already cut the overall semifinished leather export quota by 50% from April 1, this year. A further cut of the remaining 50% is sought to be effected next year leading to a total ban on export beyond 1990.

Addressing the annual general meeting of the All India Skin and Hide Tanners and Merchants Association at Madras recently, Mr. C.K. Duraivelan, President, said since the current export import policy is valid from 1988 to 1991, the trade never anticipated any ban on export during this period. The move will badly hit small tanners in particular, who thrive on export of EI leathers.

The trade is already reeling under financial constraints with the implementation of the new provision that licences will be issued only on the basis of the highest prices tendered by the exporters against bank guarantee. Despite several representations made by the trade, the Government has refused to change the policy and exports have since come to a complete standstill.

Even otherwise, semi-finished leather exports have been on the decline in the wake of the Government policy and last year, it amounted to only Rs. 72.5 crores. Mr. Duraivelan felt that it will not be in the country's interest to lose some of the traditional markets which have been built over the years.

He noted that even advanced countries are allowing export of all items, including semi-finished leather, as a happy product-mix is necessary to sustain the general export trade. In the circumstances, he appealed to the Government not to totally ban export of semi-processed leather and allow the trade to continue exporting at the current level.

Referring to tannery effluent treatment projects, he said that the common plant at Vaniyambadi is likely to be commissioned shortly. The Tamil Nadu Leather Development Corporation (TALCO) has also undert setting up of similar plants at Ranipet, Ambur and nambut where cooperative societies have already formed for the purpose.

TALCO will carry out the effluent treatment pro at Dindigul, Erode, Trichy and Pallavaram also. W ever collective disposal is not possible, many tan have put up individual plants. Mr. Duraivelan, howe made a plea to the State Pollution Control Board r be vigorous with tanners but guide them in exec the projects economically. Also, the Centre and S Government should consider granting subsidies anc loans to set up the plants.

While thanking the Tamil Nadu Government for b ing down the sales tax on dressed hides and skins 2% to 1%, he also reiterated the trade's other standing demands like total exemption of tax on of dressed hides and skins which have already attr tax at raw stage; exemption of the tanning industry the purview of tax on works contract and treating le in any stage as one commodity.

LEATHER INDUSTRY MAY FACE RAW GOOD SHORTAGE

There has been a decline in the stocks of all the r species of livestock in the country in recent years, v is feared to pose serious raw material shortage prob for the fledging domestic leather industry in the co years, writes Mony K. Mathew in *Financial Expr*

The livestock front, in fact, had recorded a po growth rate from 1977 to 1982 in almost all the st which is considered one of the major factors cont ing to increased activities in the leather industry following years. But the trend has since been reve according to a survey conducted by the Central Le Research Institute (CLRI), Madras.

The decline in stocks has been attributed to a v of factors like drought conditions, growing short fodder and grazing lands, neglect of young stocks mature slaughter of young animals and large inter-state migration of bovine stock for slaugh

The fall in grazing lands has been severe in e States. Information collected from 120 sample showed that 68% of them reported shrinkage rg lands, 31% a stagnant situation and hardly ncrease in the area. Gujarat and Maharashtra only two States where 8% of villages registered on of grazing facilities on account of additional rought under fodder crops.

gnificant reasons for the decline of grazing lands rsion for raising crops (31%), diversion for com- and housing purposes (27%) and Government ion (25%). Of these diversion for commercial and purposes is the highest in Kerala (50%), fol- y Uttar Pradesh (46%) and Rajasthan 41%).

sition by the Government led to reduction of land to the extent of 40% in Maharashtra, 33% sthan, Madhya Pradesh and Tamil Nadu and Jammu and Kashmir and Andhra Pradesh. Lack nary facilites and problems of livestock man- t are other important reasons for the decline in

rvey has found that in the absence of any con- grammes exclusively for meat animal devel- the gap between demand and supply for meat has been widening. In the process, substantial the productive and seed stock has taken place all the species of livestock.

also been noticed that the best breeds in the hat move to urban centres end up there after The young calves perish in the urban centres glect and starvation. Under the circumstan- CLRI study feels that it will be a stupendous eet the growing demand of human population f animal products, particularly meat and meat The acute shortage of supply is reflected in rise in meat prices all over the country.

m conditions that prevailed in the leather ring the last three or four years was due to slaughter and heavy mortality of animals fol- ght and fodder shortage. But the study warns dustry's long-term perspectives depend on slaughter of animals on the one hand and ing activities on the other.

EXEMPTION LIMIT MAY BE RAISED TO R.

se duty structure for leather foodwear indus- on undergo major changes. The need for modernisation of the sector to cater to the ever-growing domestic and international markets, as also the declining raw material resources necessitating conservation of leather are understood to be the major factors that have influenced the thinking of the concerned on these lines.

According to reliable sources, a five-member subcommittee set up by the Development Council for Leather and Lather Goods to study the excise structure has unanimously recommended certain changes keeping in view the basic shifts that have come about in the industry recently in its production pattern and marketing priorities. The panel, headed by Mr. A. Sanasranaman, Executive Director, Council for Leather Exports (CLE), has already submitted its report to the development council.

The committee has suggested, among other things, the raising of excise exemption limit from the present level of Rs. 15 lakhs to Rs. 1.5 crores of annual turnover. This is based on the projected massive capacity creation that is required to achieve the production and export targets set for the turn of the century.

It is pointed out that the industry will have to produce 450 million pairs of footwear by 2000 AD to meet the envisaged demand of 250 million pairs for domestic consumption and 200 million pairs for export. At 80% utilisation, this means having a production capacity of 563 million pairs.

As of now, the cottage sector accounts for as much as 266 million pairs out of a total of 350 million pairs manufactured in the country. Of the balance, 100 million pairs are made in the semi-mechanised small sector and another 24 million pairs in 15 DGTD-registered units. The excise exemption limit has been fixed with the avowed objective of supporting the cottage industry employing people from the backward communities.

However, in the context of the rapid rise in prices of raw material on export demand, without the corresponding increase in footwear prices, the hand-made footwear manufacturers in the cottage sector are now surviving by cutting their own wages. It is estimated that the wage level for a closed pair of shoes in the cottage sector is now only Rs. 20 where it is Rs. 5 in a mechanised unit.

Indication are that the wage level for the artisans in the cottage sector will continue to come down for reasons like the limited avialability of raw material and the extreme price sensitiveness of the footwear market. Already, there has been a massive exodus of artisans to other more remunerative areas like agriculture and road construction.

A spin-off of this situation is the perceptible decline in the quality of the footwear made. This is evidenced by the fact that the country could export only 15 million pairs of footwear which is less than 1% of the world export market. Even in this, good quality footwear amounts to only three million pairs.

Against this background, the committee feels that the excise policy followed by the Government has 'effectively shut the doors towards mechanisation and modernisation'. Since mechanisation is the only solution to the problem, it is observed that the time has come for a review of the objective behind the support given to the cottage sector in the form of excise duty.

The panel holds the view that for a mechanised unit to be viable, it should have a minimum capacity of 500 pairs and the annual turnover of such a unit will be around Rs. 1.5 crores. Besides, expenditure on marketing efforts will be a huge burden on the unit. In the circumstances, the committee sees a positive need to raise the excise exemption limit to Rs. 1.5 crores. Also, footwear up to a value of Rs. 125 per pair should be exempted from the duty as at today's cost it is impossible to make shoes below that level.

An alternative proposal in this regard is that units using less than 10 HP power or employing not more than 49 workers may be exempted from duty. Another recommendation of the panel is that components should not be subject to excise duty. The emerging trend in other countries, notably in Italy, is establishing assembly lines for making complete footwear from components manufactured at various ancillary units. The Union Government has also been encouraging this system which ensures better quality. In the event, the panel argues that the excise duty on components will act as a disincentive for going into assembly manufacture.

In the wake of the rapidly shrinking domestic raw material base, it is pointed out that the excise on rubber and PVC footwear should be completely dispensed with so as to conserve leather. Presently, the rate of duty on these is 20%.

The panel has also suggested doing away with the duty on branded goods if these units come under the purview of the exemption limit. The current policy is to levy duty on branded goods irrespective of the turnover limit. The CLE chairman, Mr. Mohammed Hashim, has also made a strong plea for review of the existing excise structure at the recently held Development Cou meeting in Bangalore.

NEW EXPANSION POLICY MAY HIT LEATHER INDUSTRY

The new Government policy in regard to capa expansion in finished leather manufacturing is feare adversely affect the industry. The policy, while relax the locational restrictions on setting up additional cap ity, has also made it clear that the Government will k in mind the need for regional dispersal of new tann units before granting approvals. Also, the questior restructuring the capacity in areas already oversa ated will be another point of consideration.

Finished leather industry circles feel that the policy amount to denying opportunities for the units to exp and grow as also result in the closure of a numbe units, especially in Tamil Nadu. It is pointed out that share of licensed tanning capacities in Tamil Nadu hides and skins are 33.17 and 67.79%, respectively the same time, the total availability of these raw ma ials in the State is 5.32% hides and 8.66% skins, ther keeping the capacity far above the availability.

At present, to feed the huge capacities existing in State, raw materials are being procured from other p of the country. But, in the wake of the recent libe sation, new tanning and finishing units are bounc come up in those areas which will cut off the flow of materials to Tamil Nadu. Under the circumstances, organised units in the State will have to be eventu closed down affecting sizeable employment opport ities.

Therefore, the Indian Finished Leather Manufac ers and Exporters Association has appealed to the G ernment to reconsider its decision and amend present liberalisation.

WORLD BANK KEEN TO FUND LEATHER PROJECTS

The World Bank has shown interest in funding projects in India for the setting up of sophisticat modern mechanised leather complexes, according the Indian Leather Technologists' Association (IL

An ILTA press release, issued in Calcutta said the World Bank had asked the Central Leather Resea Institute (CLRI) for proposals for setting up one unit e in the southern and eastern regions of the country. release said that Mr. Sanjoy Sen, president of the I

is also the chairman of the research council of the
l along with the director of CLRI, Dr. R.B. Mitra
ntly met Mr. Jyoti Basu to seek his assistance in
ifying a suitable plot in and around Calcutta for set-
up the proposed integrated leather complex. The
minister has agreed to identify such a piece of land
wing which a feasibility report would be made ready
presentation to the World Bank, the release said.
ording to Mr. Sanjoy Sen, the minimum requirement
nd for the proposed complex was estimated to be
nd 200-250 acres which should be located along
erennial canal or a small river.

r. Sen pointed out to the chief minister that although
cutta in recent years had emerged as the largest
orter of leather goods in India and contributed around
, to the total Indian export effort, the lack of a modern
histicated infrastructure had resulted in Calcutta not
g able to attract and retain the attention of serious
seas buyers.

THER GOODS EXPORTERS FORM ISORTIUM

e idea of consortium marketing is catching on
ng leather exporters. Some garment manufactur-
f Madras have already come together in a consort-
o maker leather garments, particularly in the US.
consortium can project a capacity of at least 20,000
ents per month. The strategy involves sending
eting teams to US and Europe and hiring the ser-
of professional sales agencies abroad. The con-
rm, a get-together of young professonals, has been
ed by Vam Exports, an existing organisation with
: 10 small garment manufacturers under its
ella.

Mr. M.M. Hashim, chairman of the Council for Leather Exports, commending consortium approach which has been successfully tried out by countries like Japan and South Korea, pointed out that the consortium would be able to present the buyer with substantial capacity, provide a wider range of products, ensure quality consistency and above all avoid unhealthy intra-constituent competition.

MEET ON LEATHER WORKERS' PROBLEM IN AUGUST

A conference to discuss the problems of leather workers is being convened during the last week of August by the Karnataka Pradesh Leather Workers' Federation which was set up about a month back.

The president of the federation, Mr. M.R. Ramaiah, told journalists in Bangalore that the conference would be attended by representatives of the International Leather Workers' Association and the All India Leather Workers' Federation. Mr. Haribhai Nayak, Vice-President, ILO (Asia) for leather, textiles and garments, and president of the Rashtriya Mills Mazdoor Sangh, Bombay will deliver the keynote address.

Mr. Ramaiah noted that there were 35 lakh people in the state dependent on this occupation and one lakh directly involved, out of which about 8,000 were working in Bangalore. These workers, he claimed, found it difficult to make profits since they had to pay an exhorbitant price for leather. Again, many of them, he said, preferred to do piece-work whereas organisations like the Karnataka Leather Industries' Development Corporation insisted on them taking bulk supplies which they could not afford.

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LEATHER NEWS FROM ABROAD

U.S. IMPORTS DOWN

United States trade statistics released by the Department of Commerce in America show imports of non-rubber footwear down 11.9%. In April 1988, 70.1 million tonnes of non-rubber footwear were imported compared to 79.6 million for the same period in the previous year. April's import figures bring the year-to-date non-rubber footwear total to 316.6 million tonnes, a decline of 7%. This is the fourth consecutive month that imports of non-rubber footwear have declined, reflecting the continued strength of the dollar in the international market. Nevertheless, imports still control 82% of the domestic footwear market.

Shoe & Leather News, 3760, 1988.

UNIDO PLANS FOR AFRICA

Faced with a world shortage of raw materials, the wastage of raw hides and skins in Africa is a tragedy both in leather industry terms and more importantly in lost potential for countries which can ill afford to throw money away. To remedy this situation, UNIDO's US $20 million scheme for the improvement of hides, skins, leather and leather products in Africa is now ready for implementation. The following is the animal population with target area.

	Target Countries		Whole of Africa	
	Head 10^6	Kill 10^6	Head 10^6	Kill 10^6
Bovine	105	9	140	13
Goat	85	24	133	43
Sheep	81	18	131	40

Leather, **190**, (4557), 98.

IULTCS XXTH CONGRESS

In October 1989, the American Leather Chemists Association will host the XXth Congress of the International Union of Leather Technologists and Chemists Society in Philadelphia. The general theme of the lectures and poster presentations will be application of science and technology to create fine leather while reducing the quantity of unprofitable by-products.

Leather, **190**, (4557), 1988.

NEW LOW CHROME COMPOUND

A recent patent has made it possible to produce leather with physical characteristics comparable to that obtained with chrome at temperatures of over 100°C while using only 0.5% of Cr_2O_3 and 1% of A 1203 with 3% of bicarboxylic acid.

Leather, **190**, (4557), 1988.

HIDE CHILLING TO REPLACE SALTING

France's research institute CTC is working with Cuirep Eurotan in developing hide chilling as an alternative to salting. The project is no longer at the pilot stage. The firm is collecting hides in a refrigerated truck in which they are hung for chilling during transportation for discharge to cold store. The next step in the development is to take the stock to the wet blue. A parallel CTC development is the production of dry white small skins. Chemicals added to the wet-white allow a drying that can later be reversed in less than half an hour.

World Leather, **1**, (5), 1988.

PIG SKIN USE SOARING

The growing importance of pig meat and the potentially greater availability of pig skin as a raw material for leather is reflected in a new pig breeding centre opened by the Meat and Livestock Commission. It incorporates some of Europe's most advanced design and technology and has been planned to cope with an anticipated boon in U.K.'s commercial use of pig. The demand has grown at the rate of 20% for the last three years and further expansion is expected over the next few years.

Shoe & Leather News, (3751), 1988.

ITALIAN INNOVATIONS

Italy has as many tanning machiney manufacturers as the rest of the EEC put together. There are about 40 ranging from companies employing less than 10 people upto about 150. Turnovers range from under pounds 500,000 to around pounds 12 million per year. Polyester industry sells over pounds 200 million worth of machinery to the world.

World Leather, **1**, (4), 1988

STATISTICS

WORLD NON-RUBBER FOOTWEAR IMPORTS: JAN.-JUNE 1987

ountry	Quantity (1000 pairs)	Per-cent of Total	Value* $ mil.	Per-cent of Total	Unit Value $	Percent change 1986-87** Quan-tity	Value	Unit Value
razil	53,781	10.6	418.3	12.9	7.78	7.8	9.0	18.2
hina	26,277	5.2	40.4	1.2	1.53	80.1	94.5	7.7
rance	2,481	0.5	42.9	1.3	17.29	16.8	4.4	14.9
reece	185	0.0	2.8	0.1	15.14	27.1	6.5	46.0
ong Kong	16,427	3.3	56.7	1.7	3.45	11.9	14.9	30.2
dia	2,540	0.5	17.3	0.5	6.81	95.3	100.3	2.6
aly	30,530	6.0	430.4	13.2	14.10	30.1	5.4	35.2
apan	627	0.1	3.4	0.1	5.42	36.2	11.7	38.6
orea	95,994	47.4	713.6	21.9	7.43	7.7	7.8	0.1
exico	3,600	0.7	24.9	0.8	6.80	84.4	58.8	13.9
ilippines	3,540	0.7	9.9	0.3	2.80	7.5	11.0	3.3
land	417	0.1	2.8	0.1	6.72	14.8	18.6	4.4
omania	1,254	0.3	7.7	0.2	6.14	78.9	85.6	3.7
ain	14,682	2.9	181.3	5.6	12.35	23.4	15.1	10.9
iwan	239,999	47.4	1175.1	36.1	4.90	8.5	26.1	16.4
ailand	3,577	0.7	15.5	0.5	4.33	15.1	19.8	5.7
goslavia	1,181	0.2	12.5	0.4	10.58	39.8	36.6	3.7
hers	8,848	1.7	97.1	3.0	10.97	3.3	2.1	0.1
orld Total	505,992	100.0	3251.9	100.0	6.43	2.4	9.4	6.3
stern Economic Countries	50,156	10.0	697.5	21.4	13.91	27.5	8.8	25.8
stern Block Countries	841	0.2	6.4	0.2	7.61	16.5	11.1	6.5

ustoms values imports for consumption. ** First half 1986 to First half 1987.

rce: US Dept. of Commerce, Bureau of the Census and International Trade Administration.(*American Shoe Making*, 362, (4), 1988).

LEATHER EXPORTS -- INDIA

orts	1985-86	1986-87	% inc.
nifinished Leather	490.72	525.00	6.99
shed Leather	2881.95	4008.94	39.71
ther Footwear	330.31	803.83	143.36
twear Components	1903.52	2406.92	26.45
ther Garments	167.22	622.67	272.37
ther Goods	774.64	825.35	6.55
dlery &Harness	76.78	115.05	49.84
al	6625.14	9307.76	40.49

GERMAN LEATHER INDUSTRY

(in mil. DM)

	Shipments	Exports	Imports
Leather Industry	1425	800	1523
Shoe Industry	6194	1247	5348
Leather goods Industry	1900	570	1200

FOOTWEAR & LEATHER MACHINERY -- 1987

(in mil. DM)

Tanning Machinery	65.0
Shoe Machinery	253.5
Sewing Machinery	150.0
Shoe replacing Machinery	16.3
Leather goods Machinery	15.6
Total	500.4

NOTICE

GUJARAT HEAVY CHEMICALS LIMITED

REGISTERED OFFICE: MISTRY CHAMBERS (6TH FLOOR), KHANPUR, AHMEDABAD 380 001.

FORM IIA

(See Rule 4A (1))

It is hereby notified for the information of the public that M/s. Gujarat Heavy Chemicals Limited proposes to make an application to the Central Government in the Department of Company Affairs, New Delhi, under Section (2) of Section 22 of the Monopolies and Restrictive Trade Practices Act, 1969 for approval to the establishment of a new undertaking. Brief particulars of the proposal are as under:

(1) Name and address of the applicant :

GUJARAT HEAVY CHEMICALS LIMITED
Mistry Chambers (6th Floor),
Khanpur, Ahmedabad 380 001.

(2) Capital Structure of the applicant organisation :

Authorised Capital: 100.00 crores
Subscribed Capital: 72.00 crores
Paid-up capital: 71.00 crores
(Equity shares of Rs. 10/ each).

(3) Management structure of the applicant organisation indicating the names of the Directors, including Managing/Whole-time Directors and Manager, if any :

The Company is managed by the Board of Directors
Names of Directors:

1) Shri H.R. Patankar -- Chairman
2) Shri S.K. Shelat -- Director
3) Shri Sanjay Dalmia -- Director
4) Shri Anurag Dalmia -- Director
5) Dr. P.K. Das -- Director
6) Dr. B.C. Jain -- Director
7) Shri P.M. Thomas -- Director (Nominee--IDBI)
8) Shri B.Y. Srinivasan -- Director (Nominee--LIC)
9) Shri V. Dixit -- Director (Nominee -- IFCI)
10) Shri K.C. Sharma -- Director
11) Shri Shobhan M. Thakore -- Director
12) Shri P.P. Vora -- Director
13) Shri Y.K. Jain -- Managing Director

(4) Indicate whether the proposal relates to the establishment of a new unit/division : New Undertaking

(5) Location of the new Undertaking : Salempur, Dist. Aligarh, U.P.

(6) Capital structure of the proposed Undertaking : The proposed equity capital of the new undertaking will be Rs. 120 crores.

(7) In case the proposal relates to the production, storage, supply, distribution, marketing or control of any goods/articles, indicate

(i) Names of goods/articles:	Benzene	O-xylene	P-xylene	Heavy Aromatics
(ii) Proposed licensed capacity:	1,00,000 tons	35,000 tons	1,07,000 tons	7,580 tons
(iii) Estimated Annual turn-over (Rs. in lakhs)	7,700	3,500	1,600	2,700

(8) In case the proposal relates to the provision of any service, state the volume of activity in terms of usual measure such as value, income turnover etc. : Not applicable

(9) Cost of the Project : Rs. 600 crores

(10) Scheme of finance, indicating the amounts to be raised from each source :

Equity Capital:	Rs. 120.00 crores
Loan from Financial Institutions etc.:	Rs. 480.00 crores
	Rs. 600.00 crores

Any person interested in the matter may make a representation in quadruplicate to the Secretary, Department of Company Affairs, Government of India, Shastri Bhavan, New Delhi, within 14 days from the date of publication of this notice, intimating his view on the proposal and indicating the nature of his interest therein.

for GUJARAT HEAVY CHEMICALS LIMITED

(M.N.K. NAIR)
COMPANY SECRETARY

Dated: 30th July 1988

MARKET INFORMATION

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent — and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

Benzene Shortage Acute

Benzene, an essential output for the dyes, chemical, paint and host of other industries, is in acute shortage. The refineries have not been supplying this item in required quantity. In the meantime HOC plant is also reported to be shut down. The quality of benzene from steel plant was not upto the mark. Toluene and xylene continued to be short. Phenol also moved up. However, MEK, GH-17 and PVA moved down slightly. Bromine shot up to Rs. 60 and ready goods were not available. Butyl acrylate monomer, styrene monomer exhibited lower tendency.

Bon Acid was quoted at Rs. 125, up by Rs. 7 and 8. Meta ureido aniline moved upto Rs. 170. MPD shortage continued. Tobias acid and sulpho tobias were also in short supply. Dyes manufacturers are facing acute raw material shortage that is affecting their exports.

(Prices as on 18th August 1988)

INDUSTRIAL CHEMICALS	Per kg
Ammonium sulphate	2.00
Ammonium phosphate (Mono)	14.50
Ammonium phosphate (Di)	12.00
Ammonium carbonate (Di)	17.00
Ammonium bicarbonate	4.75
Ammonium chloride	3.00
Ammonium nitrate	3.50
Arsenic white powder	21.00
Acrylamide (Resale)	88.00
Barium carbonate	6.00
Bleaching powder (33% Cl)	4.00
Borax (Granular)	13.50
Borax (Powder)	21.00
Boric acid (Tech.)	22.00
Bisphenol-A	71+ST
Butyl carbitol	48.00
Caustic soda (Flakes)	9.20
Caustic soda (Solid)	8.00
Caustic soda (Lye)	7.00
Calcium chloride 70% (solid)	3.25
Calcium chloride 75-80% (fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium Carbonate PPT	3.00
Calcium carbonate (Activated)	3.55
Camphor (Indian)	82.00
Cresylic acid	50.00
Cream of Tartar (Tech.)	70.00
Citric acid (Belgium) (Resale)	43.00
Citric acid (Indian) (Resale)	42.50
Copper sulphate	21.00
Chromic acid	48.00
Cyanuric chloride	120.00
Cobalt oxide	280.00
Carbitol	60+ST

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Ethylene urea	56.00
Ferric chloride (Lumps)	7.00
(Anhydrous)	16.00
Glue flakes	8.45
Glue sheets	6.75
Gohsenol GH-17	130+ST
Hydro (Resale)	41.50+ST
Hyflosupercell	24+ST
Hexamine (Resale)	35.00
Industrial Wax	25.00
Litharge	15.00
Lead Acetate (Tech)	28.00
Lithopone	18+ST
Magnesium chloride (Crystal)	1.00
Menthol crystal (Flakes)	185+EX.+ST
Menthol bold	205+Ex.+ST
Menthol crystal bold	245+Ex.+ST
Magnesium carbonate (Japan)	16.00
Magnesium carbonate (Indian)	15.00
Maleic Anhydride (per kg) (Resale)	55.00
Mercury (75 lbs.)	10500.00
Nickel chloride	90.00
Oxalic acid (Resale)	22.00
Peppermint oil (Rectified)	90+Ex.+ST
Potassium carbonate (Indian)	19.00
Potassium carbonate (Imported)	23.00
Potassium bichromate	22.00
Potassium phosphate (Mono)	14.00
Potassium phosphate (Di)	14.00
Polyvinyl alcohol (No. 117)	120+ST
Polyvinyl alcohol (No. 173) (Resale)	135+ST
Polyvinyl alcohol (No. 208)	150.00
Paraforfaldehyde (Resale)	22+ST
Phthalic anhydride 36% (Resale)	24.00
Pentaerythritol (Resale)	51.00
Paraffin wax (Resale)	14.50
Rangolite (German)	96+ST
Rangolite (Czech.)	54+ST
Sodium sulphate (Fine)	8.00
Sodium sulphate (Coarse)	5.00
Sodium sulphide 50-52% (Flakes)	11+ST
Sodium sulphide 58-60% (Flakes) (TCL)	19.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale)	700.00
Sodium chlorite 80% (Spain)	90.00
Santobrite (Indian)	36.00
Soda Ash (Tata)	4.00
Soda Ash (Birla)	3.80
Soda Ash (Imp.)	3.50
Sodium bicarbonate	5.25
Sodium bisulphite	4.50
Sodium silicate	3.00
Sodium acetate	6.00
Sodium alginate	160+ST
Titanium Dioxide (Anatase)	56+ST
Titanium Dioxide (Rutile — RCR_2)	78+ST
Tartaric acid (Crystal)	94.00
Trisodium phosphate	4.80
Thiourea	78+ST
Urea (Tech)	2.75
Zinc Dust	30.00
Vacuum salt	1.00
Zinc Oxide	30.00
Zinc chloride powder (technical)	14.00
Zinc sulphate	4.00

SOLVENTS	Per kg.
Acetic Acid (Glacial) (Resale)	17.00
Acetic Anhydride (Resale)	25.00
Acetone (Resale)	17.00
Adipic Acid	55+ST
Aceto Acetanilide	50.00
Aniline Oil (Resale)	50.00
Benzoate Plasticiser	45.00
Butyl acrylate	84+ST
Butyl stearate	36.0
Butanol (Resale)	35.0
Benzyl Alcohol	60.0
Benzyl chloride	34.0
Benzo trichloride	16.0
Benzoyl chloride	22.0
Bromine Liquid	60.0
Chloroform	25.0
Carbon Tetrachloride	17.0
Cellosolve	47+S
Cyclohexanone	53+S
Cyclohexanol	43+S
Diacetone (Resale)	35.0
Diethyl Oxalate	34.0
Diethylene glycol (DEG)	46+S
Dioctyl Phthalate	52.0
Diallyl Phthalate	56.0
Dimethyl Phthalate	28.0
Dioctyl Adipate	52.0
Dibutyl Adipate	42.0
Dipentene	15.0
Dimethylamine 40%	12.0
Dimethylamine 60%	14.0
Ethyl Acetate	19.0
Ethyl Acrylate	54.0
Ethylene Dichloride	11.0
Ethylene Glycol	45+S
Formic Acid (Imp) (Resale)	29.0
Formaldehyde (Resale)	6.5
Glycerine (CP)	53.0
Glycerine (IW)	48.0
Hydrogen peroxide 50% (Resale)	26.5
Isopropyl Alcohol	21.0
Iso Butyl Alcohol	28.0
(Resale)	30.0
Monoehanolamine (Resale)	52.0
Melamine	50+S
Methyl Ethyl Ketone	55.0
Methyl Isobutyl Ketone	36.0
Methyl Acrylate	42.0
Methyl Dichloride (Resale)	23.0

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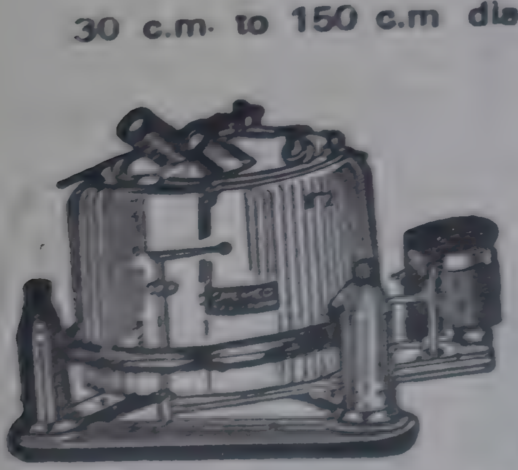

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Polyethylene Glycol (No. 500)	42.00
Polyethylene Glycol (No. 1600)	14.00
Polyethyene Glycol (No. 4000)	38.00
Polyethylene Glycol (6000)	50.00
Para Cresol	40.00
Styrene monomer	46.+ST
Sorbitol	16.00
Sulphuric Acid	2.10
Trichloroethylene	28.00
Triethanolamine (Resale)	49.80
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	11.75
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Vinyl Acetate Monomer	43.50

SOLVENTS	Per Litre
Benzene	16.00
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Alphanaphthylamine	60.00
Alpha Naphthol (Imp.)	185.00
Aceto Acetic Ester (Methyl)	60.00
Ammonium Molybdate	200.00
Anthraquinone	100.00
Anthranilic Acid	60.00
2-Amino-4-Nitrophenol (Imp.)	140.00
Blue B. Base (Local)	230.00
Beta Naphthol (Atul)	60.00
Benzidine Dihydrochloride (BDH)	80.00
Bromamine Acid	400.00
BON Acid	125.00
Chicago Acid	285.00
Coach Acid	58.00
C. Acid (Imp.)	260.00
Cyanuric Chloride (Japan)	120.00
2, 4, DNCB	29.00
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Diethyl Aniline	155.00
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3, 3-DCB (Imp.)	180.00
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Para Anisidine (PA-Imp.)	110.00
Para Anisidine (PA-Local)	90.00
PNA	70.00
Para Cresidine (Imp.)	335.00
Para Amino Azo Benzene (India)	130.00
PNCB	32.00
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Trichloro Benzene (TCB)	21.00
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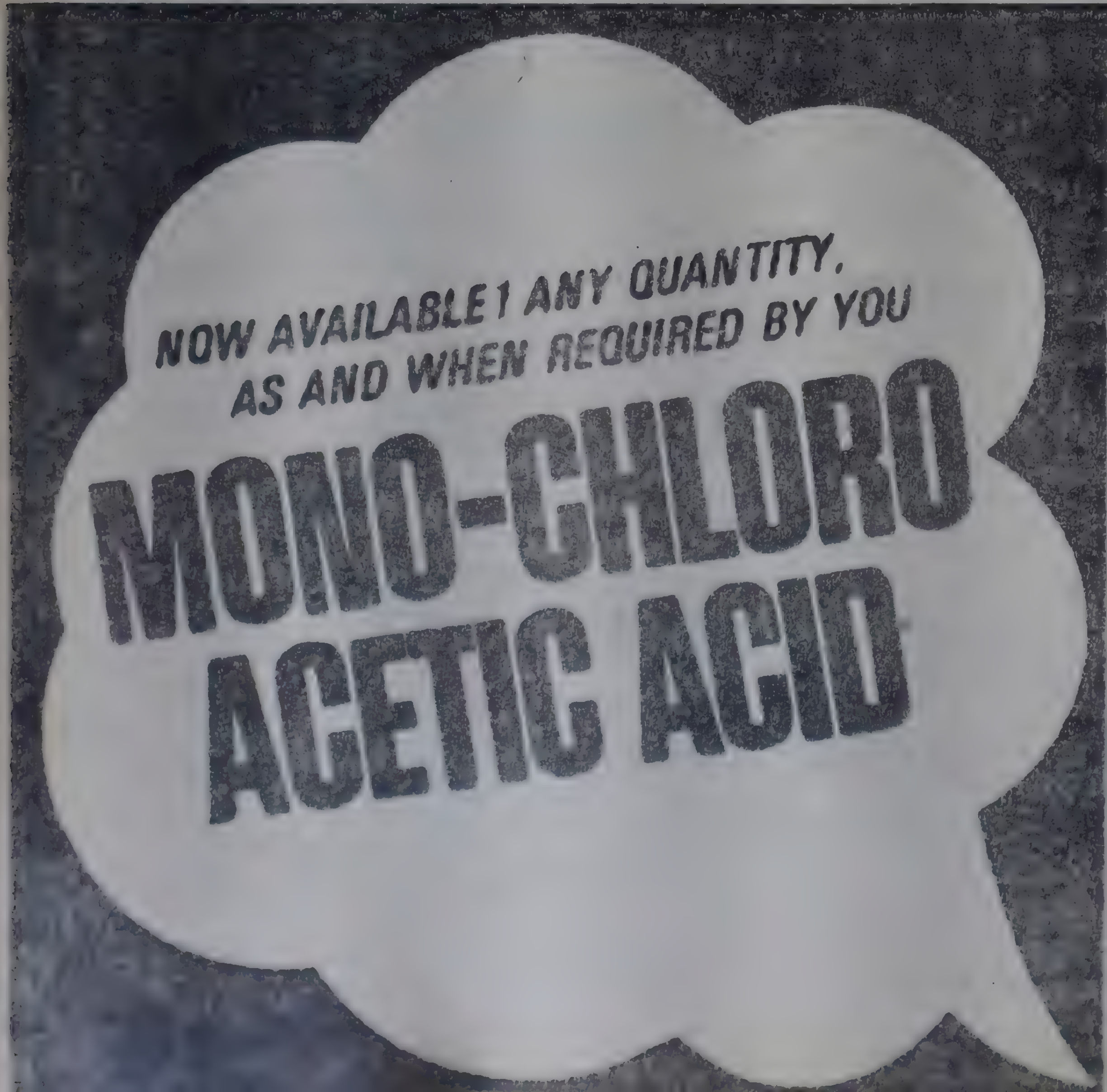

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Gujarat State Fertilizers Company Limited., Vadodara

Marketed By :

Industrial Trading Agency

BRANCH
Vadodara-390 001.
Tel. No. : 554690

OFFICE :
36, Tamarind Lane, Fort, Bombay-400 023.
Tel. Nos. : 272405/270393

(Inquiries for Acetone Cyanohydrine (GUJACH) and Methyl Methacrylate Monomer (GUJMER) for chemical application also solicited.)

Bombay dyes market

(Prices as on 19th August 1986)

ACID COLOURS	Per Kg.
Acid Violet 4BS	165.00
Acid Maroon V	120.00
Acid Orange II	70.00
Acid Orange 2Y	85.00
Acid Red A	107.25
Chrome Scarlet MOO	150.00
Acid Scarlet 3R	66.00
Acid Red SSN	130.00
Acid Red NSB	132.00
Acid Red BS	91.00
Acid Green V	150.00
Acid Patent Blue AB	250.00
Acid Coomassie Blue	300.00
Acid Yellow SGN	90.00
Acid Red PC	80.00
Acid Red GRS	75.00
Acid Black 10 BX	122.00
Acid Black BX	85.00
Acid Black Wax	138.50
Procinyl Yellow GS (ICI, UK)	300.00
Procinyl Red GS (ICI, UK)	330.00
Procinyl Blue RS (ICI, UK)	315.00
Procinyl Scarlet G (ICI, UK)	900.00
Procinyl Orange G (ICI, UK)	850.00
Procinyl Rubine (ICI, UK)	950.00

DIRECT COLOURS	Per Kg.
Yellow 3GX	89.20
Sun Yellow RCS	126.00
Fast Yellow GCH	141.75
Yellow CRG Hy. Conc.	322.50
Fast Yellow GS	112.45
Fast Yellow CHRB	95.40
Formal Orange A	195.15
Fast Orange GB	138.75
Red	95.80
Dark Tan	75.25
Red 2B	[illegible]
Red 4B	[illegible]
Bordeaux BY	[illegible]
Fast Scarlet 4BS	195.55
Red 2B	[illegible]
Bordeaux Hy. Conc.	[illegible]
Congo Red R	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Sol. Violet Extra	128.40
Blue 2B	88.50
Blue G	170.50
Sky Blue FS	188.25
Copper Blue GR	147.00
Fast Greenish Blue GL	114.80
Developed Black BT	178.10
Blue NB-2S	300.20
Blue NB-2BC	288.30
Developed Black NB-GHD	185.30
Green B	111.80
Green NB-B	186.25
Green 2B-N	286.25
Brown MR	158.40
Brown CN	177.20
Golden Brown G	141.35
Catechin G	120.50
Omega Tan	178.40
Catechin GS	102.80
Black E Hy. Conc.	162.80
Black E Extra Hy. Conc.	148.40
Black NB-EX Hy. Conc.	111.50

DISPERSOL COLOURS	Per Kg.
Yellow 9G Powder	161.50
Red B 2B Powder	247.50
Red B 2B Powder	823.20
Red CB Powder	438.15
Red DBB Powder	477.40
Violet C 4B	511.90
Blue BG Powder	225.43
Blue BN Powder	402.75
Blue D 2R Powder	474.25
Navy BT Powder	263.90
Blue B 2G Powder	214.20
Black BT Powder	192.40
Blue BR Powder	340.20
Yellow 7GL	236.60
Yellow 5RX	214.00
Yellow 3G	367.25
Yellow	148.40
Yellow AL	135.30
Yellow Brown 5R	302.00
Yellow RE	450.00
Gold Yellow 2G	256.75
Pink B2	287.10
Red RGL	600.65
Red 2B	227.40
Red FB	226.27
Red [illegible] FB	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Scarlet RA	
Rubine 3B	
Rubine CB	
Blue GL	
Blue SGP	
Navy Blue RP	
Brown 3RE	
Black CEL	
Dark Brown 8B	

BASE COLOURS	
Fast Yellow GC	
Fast Orange GC	
Fast Scarlet R	
Fast Scarlet RC	
Fast Scarlet RCB	
Fast Scarlet G	
Fast Scarlet GN	
Fast Scarlet GG	
Fast Scarlet GGS	
Fast Red F	
Fast Red RC	
Fast Red R Flake	
Fast Red TR	
Fast Red TR Oil	
Fast Red RL	
Fast Red KB Oil	
Fast Bordeaux GP	
Fast Garnet GBC	
Fast Violet B	
Fast Blue BB	

NAPHTHOL COLOURS	
ASG	
AS	
ASSW	
ABBS	
ASBO	
ASD	
ASOL	
ASTR	
ASBS	
ASE	
[illegible]	
[illegible]	

...RS	Per Kg.
	121.80
	117.85
GP	188.15
G	188.65
	278.15
	832.30
	343.15
	228.15
G	177.10
	332.30
	217.80
B	241.25
	197.25
	213.15
	169.45
	245.15
	179.50
	243.45
	197.00
	98.30
	173.70
	127.10
B	121.55
	185.20
	175.40
	293.50
	363.55
	173.10
	283.85
	179.70
	898.15
	234.45
	335.70
B MP	181.50
	916.80
	252.80
	[illegible]

Navy Blue M 3R	318.25
Brill. Blue MR	331.10
Brill. Blue M RX	314.80
Brill. Blue M-G	262.30
Blue M 4GD	264.85
Navy Blue M RR	412.75
Turquoise M-G	127.25
Brill. Blue M GZ	302.30
Blue ZZ Azra Powder	713.30
Dark Brown H 6R	362.45
Cobalt Oxide (per kg.)	283.00
Green H 4BD	[illegible]
Green H-7ABD	166.40
Red Brown H 7V	143.35
Orange Brown H 2R	219.15
Brown M-GRB	122.30
Black H-B	123.[illegible]

SULPHUR COLOURS	Per Kg.
Navy Blue	36.25
Green G	196.25
Black Grains Extra	41.85
Black Grains OG	44.35
Black GXE Conc.	42.65
Black GXE	92.75
Black GXR	47.[illegible]
Black Grains 300	54.25
Black EXR Grains	44.20
Black EXR Grains 8[illegible]	51.25

VAT COLOURS ICI	Per Kg.
Yellow 5G Powder Fine	473.15
Yellow 5G Supra Disperse	426.30
Yellow 5G Azra Con	458.75
Yellow 2R Powder	393.25
Gold Orange 3G Pdr. Fine	262.10
Brill. Orange 6R Pdr. Fine	624.15
Gold Orange 3G Supra Disp	[illegible]
Brill. Orange GRX Powder	394.30
Brill. Red 3B Pdr. Fine	997.80
Brill. Red 3B Supra Disp	711.50
Brill. Purple 4R Conc. Pdr.	478.75
Brill. Purple 2R Azra Powder	990.25
Brill. Purple 2R Elr Conc	897.85
Brill. Purple 4R Supra Disp	510.85
Brill. Purple 2R Azra Conc	435.[illegible]
Blue R Powder Fine	542.25
Blue RC Conc. Pdr. Fine	922.35
Blue RC Azra Conc. Pdr. Fine	[illegible]
Blue R Conc. Pdr. Fine	677.85
Blue RR Supra Powder	478.35
Blue Conc. Powder	480.45
Brill. Blue 3R Elr. Conc.	713.25
Brill. Blue 3R Supra Disp.	318.05
Dark Blue 3R Powder Fine	[illegible]
Blue RC Supra Disp.	382.40
Jade Green X230 Powder Fine	438.25
Jade Green X230 Azra Conc. Powder	452.30
Jade Green XG Pdr. Fine	414.65
Jade Green XG Pig. Paste	125.40
Jade Green X230 Pig. Paste	129.15
Jade Green XG Supra Disp.	408.10
Olive Green B Pdr. Fine	300.30
Olive D Pdr. Fine	466.30
Olive Green B Supra Disp.	378.30
Jade Green X230 Supra Disp. 2[illegible]	377.25
Olive GMW Pdr. Fine	398.25
Olive GMW Supra Disp.	528.85
Olive R Pdr. Fine	622.90
Olive D Supra Disp.	361.75
Olive R Supra Disp.	573.80
Olive D Pig. Paste	133.80
Olive Green B Pig. Paste	146.15
Olive Green B Azra Conc.	562.70
Olive R Azra Conc.	440.65
Olive Green B Azra Conc.	562.70
Brown R Pdr. Fine	325.65
Brown G Pdr. Fine	705.65
Brown R Pdr. Fine	456.75
Dark Brown 3R Pdr. Fine	496.65
Brown G Supra Disp.	445.85
Brown 3G Supra Disp.	594.80
Brown R Supra Disp.	452.80
Brown 3R Powder	713.50
Dark Brown 3R Pig. Paste	207.35
Dark Brown 3R Supra Disp.	458.60
Brown G Azra Conc.	702.45
Brown R Azra Conc.	769.60
Grey M Powder Fine	755.80
Grey M Supra Disp.	335.45
Blue RC Azra Conc. Pdr. Fine	792.70
Direct Black AC Supra Disp.	372.30
Direct Black AC Pdr. Fine	474.70
Direct Black CR Supra Disp.	383.30
Direct [illegible] Pig. Paste	[illegible]

Madras Market

Moderate conditions prevailed in the market. There was brisk activity in items like Bleaching Powder, Caustic Soda, Soda Ash etc. There was good purchasing of Bleaching Powder and other Sanitation Chemicals by Public Health authorities to check the outbreak of infectious diseases. The Benzene/Toluene shortage is assuming serious proportions resulting in closure of factories including HOC Cochin Phenol plant, affecting exports of Phenol.

(MADRAS MARKET RATE AS ON AUGUST 20, 1988)

Acetic Acid Glacial (per kg)	18.75
Aluminium Sulphate Iron Free (per MT)	1800.00
Ammonium Bicarbonate (per 25 kg)	125.00
Acid Slurry Soft (per kg)	27.00
Ammonium Chloride SPIC (per MT)	2,800.00
Bleaching Powder (per 25 kg bags)	110.00
Borax Granular (per 50 kg)	650.00
Caustic Soda Flakes — Mettur Chemicals (per MT)	8,600.00
Caustic Soda Flakes — Andhra Sugars (per MT)	8,600.00
Citric Acid (per kg)	48.00
Copper Sulphate (per 50 kg)	1000.00
Cresylic Acid 98/99% (per kg)	87-00
Meta Cresol 40/42% (per kg)	38-00
Para Cresol 80/85% (per kg)	67-00
Formic Acid (per kg)	27.00
Formaldehyde (per kg)	9.00
[illegible]	[illegible]

Hydrosulphite of Soda — TCPL (per kg)	40.00
Hydrosulphite of Soda — IDI (per kg)	42.00
Hydrosulphite of Soda — BASF (per kg)	44.00
Hydrogen Peroxide (per kg)	30.00
Hyflo Supercell (per kg)	19.50
Magnesium Carbonate (per kg)	15.00
Potassium Bichromate (per kg)	26.00
Phosphoric Acid (per kg)	19.00
Phthalic Anhydride (per kg)	24.00
Pentaerythritol (per kg)	52.00
Paraffin Wax (per kg)	13.50
Oxalic Acid (per kg)	24.00
Soda Ash — TAC (per 75 kg bags)	320.00
Soda Ash — TATA (per 75 kg bags)	325.00
Sodium Cyanide Indian (per kg)	55.00
Sodium Cyanide (Degussa) (per kg)	80.00
Sodium Bichromate (per kg)	20.00
Sodium Bicarbonate (per 50 kg bags)	290.00
Sodium Nitrate (per 50 kg bags)	[illegible]

Sodium Nitrite (per 50 kg bags)	
Sodium Silicate (per MT)	4
Sodium Sulphate (per MT)	
Sodium Sulphide Flakes (per MT)	1
Sodium Bisulphite (per 50 kg)	2
Stearic Acid (per kg)	
Trisodium Phosphate (per 50 kg)	
Titanium Dioxide — Indian TTP — (per kg)	
Titanium Dioxide — Indian (Rutile) (per kg)	
Urea Tech (per MT)	2
Zinc Oxide (per kg)	
Zinc Chloride Powder (per kg)	
Zinc Sulphate (per MT)	4.
Di-octyl Phthalate (per kg)	
Di-butyl Phthalate (per kg)	
Hexamine (per kg)	

SOLVENTS

Acetone — HOCL — (per kg)	
Acetone — NOCIL — (per kg)	
Diacetone (per kg)	
Diethylene Glycol (per kg)	
Isopropyl Alcohol (per kg)	
Butanol (per kg)	
Benzene — SAIL — (per lit.)	
Toluene — SAIL (per lit.)	
Xylene — SAIL — (per lit.)	
Phenol — HOCL — (per kg)	
Turpentine (per lit.)	
Trichloroethylene — MCIC — (per kg)	
Carbon Tetra Chloride (per kg)	
Chloroform (per kg)	
Methylene Chloride (per kg)	
Methanol (per kg)	
Methyl Ethyl Ketone (per kg)	
Cellosolve (per kg)	
Butyl Acetate (per kg)	
Ethyl Acetate (per kg)	
[illegible]	

Delhi Market

AUGUST 19, (1988) —
... went up sharply by Rs.
kg.) in the Delhi chemi-
during past week, on brisk
purchasing by exporters and
exports sale. Ammonia bi-
... paraffin wax also sho-
ward trend whereas He-
ered a sharp fall of Rs. 3
ply. Turnover was moder-
e week caused by heavy
g the week.

...ent of limited inflow from
with heavy demand from
...ries of Delhi and exporters
Menthol bold went up shar-
20 at Rs. 285 (per kg.)
s. 50 (per kg.) was repor-
hol bold arrivals. Two va-
Menthol medium advan-
255 to Rs. 285 and flakes
Rs. 238 against Rs. 222
...rtage of stocks. Menthol
up from Rs. 175 to Rs.
...0) remained static at Rs.

...sence of fresh inflow from
increased demand by stoc-
kists, titanium dioxide Anatase and RC-822 appreciated by Rs. 1-2 at Rs. 57 and Rs. 78 (per kg.) respectively and good demand by paint units.

Ammonia bicarb marked up further by Rs. 5 at Rs. 140 (per 25 kg.) on account of good demand from Haryana, Punjab and West Bengal induced by tight supply position. Paraffin wax recorded a gain of Rs. 10 at Rs. 650 in the absence of arrivals from Assam due to flood. Formaldehyde moved up by Rs. 1 at Rs. 9 (per kg.) on tight supply.

Hexamine, however suffered a sharp decline of Rs. 3 at Rs. 34 (per kg.) in the absence of demand by industrial units as well as comfortable supply.

Sodium hydro sulphite Golshen sof-tened from Rs. 38 to Rs. 37 on thin trading. Mercury citric acid, tartaric acid, soda ash and soda bicarb prices hovered around at their last week levels.

Dyes and colours also ruled easy in the absence of demand due to rainy weather.

(DELHI MARKET RATES AS ON AUGUST 19, 1988)

...arb (per 25 kg)	140.00
...flask)	11,000.00
...r bag)	270-300.00
...loride	125-130.00
... solid)	No Stock
...flakes	398-400.00
...r 50 kg)	2100-2400.00
...ing Powder ...er 25 kg)	95.00
...ing Powder KCl 25...)	38.00
...ing Powder ... 25 kg)	88.00
...ers	265-275.00
...ulphite	37-43.00
[illegible]	[illegible]

Boric acid Technical (per 50 kg)	1025.00
Paraffin wax (per 50 kg)	650.00
Tartaric acid (per 50 kg)	6,000.00
Borax Granular (per 50 kg)	565.00
Borax Crystal (per 50 kg)	580.00
Sodium Nitrate (per 50 kg)	430.00
Sodium Nitrite (per 50 kg)	675-700.00
Camphor Powder (per kg)	86.00
Camphor Thal (per kg)	102.00
Menthol Medium (per kg)	285.00
Menthol Flakes (per kg)	238.00
Menthol Bold (per kg)	285.00
Glycerine (per kg)	47-48.00
Sodium Silicate (per [illegible])	[illegible]-250.00
[illegible]	[illegible]

Acetic Acid Glacial (per kg)	14.50-17.00
Copper Sulphate (per quintal)	[illegible]
Formic acid (per kg)	28.00
Formaldehyde (per kg)	9.00
Hydrogen Peroxide (per kg)	27-29.00
Calcium Carbonate (per tonne)	2500-4000.00
Acid Slurry Soft (per kg)	24.00
Acid Slurry Hard (per kg)	32.00
Phosphoric Acid (per 50 kg)	800.00
Pot. Nitrate (per quintal)	900-1250.00
Pot. Permanganate (per 50 kg)	2300.00
Sod. Bichromate (per 50 kg)	1050-1150.00
Tri-Sod. Phosphate (per 50 kg)	250-260.00
Titanium Dioxide Anatase (per kg)	57.00
Titanium RC-822 (per kg)	78.00
Zinc Oxide (per mt)	35,000-42,000.00
Phenol Carbolic Acid (per kg)	33.00
Carbon Tetrachloride (per kg)	20.00
Chloroform (per kg)	28.00
Sodium Sulphate (per 50 kg)	150-170.00
Naphthalene Balls (per 50 kg)	1350.00
DYES & COLOURS	(per kg)
Naphthol AS	156.00
Naphthol ASG	248.00
Naphthol ASBS	210.00
Naphthol ASTR	320.00
Naphthol ASOL	202.00
Naphthol ASBO	220.00
DIRECT DYES	(per kg)
Black E. Conc.	115-180.00
Diazo Black MT	125-130.00
Green B	120-127.00
Blue 2-B	85-92.00
Sky Blue FB	213.00
Basic Auramine	95-110.00
Basic Rhodamine	[illegible]
Basic Methylene Blue	92-130.00
Basic Violet	140-150.00
Basic Malachite Green	140-165.00
[illegible]	[illegible]

MATERIALS IMPORTED

(Contd. from the previous issue)

BOMBAY

(From 22-2-88 to 29-2-88)

SODIUM 2 ETHYL HEXANOATE: From UK: Ranbaxy Laboratories Ltd., 1,000 kgs., Rs. 66,864.

SODIUM GLUCONATE POWDER: From Netherlands: Grauer & Weil (India) Ltd., 2,000 kgs., Rs. 37,651.

SODIUM METHOXIDE: From FRG: Hindustan Lever Ltd., 1,000 kgs., Rs. 51,739.

SODIUM NITRITE: From FRG: Indian Dyestuff Ind. Ltd., 21,000 kgs., Rs. 1,14,734.

EPICHLORO HYDRINE: From Japan: M. J. Exports P. Ltd.; 15,840 kgs., Rs. 3,49,612.

SOYA LECITHIN: From Brazil: Britannia Inds. Ltd., 15 kgs., Rs. 99, 321; Jenson & Nicholson India Ltd., 5,000 kgs., Rs. 34,471; From FRG: Fluid Air India Pvt. Ltd., 17 Mts., Rs. 1,12,565; Nesha Plast Inds., 34 Mts., Rs. 2,25,130; From Japan: Cornstram Steel, 17 Mts., Rs. 1,12,565.

STEMONE: From Switzerland: Mysorewala Sugandhit Dhoop Factory, 25 kgs., Rs. 11,071.

SUCRALFATE: From China: Lupin Labs Ltd., 500 kgs., Rs. 68,487.

SULPHURIC ACID: From France: Shivalik Bimetal Controls Ltd., 1,620 lbs., Rs. 16,840.

SULPHUR INSOLUBLE: From FRG: Modi Rubber Ltd., 16,000 kgs., Rs. 4,73,539.

SULPHUR INSOLUBLE: From Japan: Bombay Boat Builders & Co., 5,000 kgs., Rs. 68,162

SYNTHETIC RESIN: From Japan: Chetna Polycoats Pvt. Ltd., 2,000 kgs., Rs. 39,988; From UK: Snowcem India Ltd., 39.2 Mts., Rs. 6,15,466; From USA: Eagle Plastic Pvt. Ltd., 12,727 kgs., Rs. 3,69,132; Mansukhlal & Co., 172.37 kgs., Rs. 11,819; Poonam Plastic Inds., 40 Mts., Rs. 1,97,346.

TEREPHTHALIC ACID PURE: From UK: Reliance Inds. Ltd., 2,000 Mts., Rs. 1,49,63,430.

TETRA HYDROXY PARAMETHYL QUINOLINE: From Switzerland: Mysorewala Sugandhit Dhoop Factory, 1 kg., Rs. 1,359.

THIOUREA: From Japan: Eagle Chemical Works, 1,000 kgs., Rs. 24,668; From Japan: Industrial Trading Co., 1,425 Mts., Rs. 32,932; Parth Laboratories Pvt. Ltd., 1,000 kgs., Rs. 24,668.

TITANIUM DIOXIDE: From Japan: Wellknown Tools & Equipments, 17,000 kgs., Rs. 4,63,501; From USA: Chemicals De Universe P. Ltd., 17 Mts., Rs. 5,18,681; U.K. Paint Inds., 68 Mts., Rs. 17,56,893.

TITANIUM DIOXIDE RUTILE: From Belgium: The National Leather Cloth Mfg., 18,000 kgs., Rs. 5,35,170; From France: Burroughs Wellcome (India) Ltd., 9 Mts., Rs. 2,47,134; Uptron Capacitors Ltd., 9 Mts., Rs. 2,47,134; From Japan: Garware Paints Ltd., 17,500 kgs., Rs. 4,65,774. Shriram Honda Power Equipment, 15,607 Mts., Rs. 4,48,818; Unilok Adhesives & Chemicals Ltd., 250 kgs., Rs. 14,444; From UK: Sigma Paints Ltd., 20,000 kgs., Rs. 5,72,561; From USA: Asian Paints India Ltd., 2,04,000 kgs., Rs. 52,309,952; Breda Bros., 15,607 Mts., Rs. 4,48,818.

TOLUENE DI ISOCYANATE: From Belgium: Leo Templon Insulation Pvt. Ltd., 5,500 kgs., R
1,53,527.

TRIETHYLAMINE: From USA
Tata Exports Ltd., 3,039.1 kgs
Rs. 65,696.

TRIETHYL PHOSPHATE: Fro
FRG: IDI, 3,080 kgs., Rs. 1,35
510.

3,4,5 TRIMETHOXY BENZAL
DEHYDE: From China: Suche
Laboratories, 1,000 kgs., R
2,85,631.

TRIMETHOXY BENZALDEHY
DE: From Japan: 1,020 kgs., R
31,208/44 Sieves Manufacturer
1,000 kgs., Rs. 2,75,894.

3,4,5 TRIMETHOXY BENZA
DEHYDE: From Poland: Cureta
Drugs & Intermediates, 100 kg
Rs. 3,44,056.

TRIMETHOXY BENZALDEH
DE: From Romania: The S.T.
of India Ltd., 1,000 kgs., R
2,75,894.

3,4,5 TRIMETHOXY BENZA
DEHYDE: From Saudi Arabi
Grover Overseas P. Ltd., 5
kgs., Rs. 1,52,554.

TRIMETHYLOL PROPAN
From Sweden: Goodlass Nerol
Paints Ltd., 13,000 kgs. F
2,95,369.

2,2,4 TRIMETHYL 1,3 PENT
NE DI ISOBUTYRATE: From J
pan: Vijay Cable Inds., 15,2
kgs., Rs. 2,04,252.

VANILLIN: From Switzerlan
The Bharat Indl. Corpn., 30 kg
Rs. 14,086.

VINYL ACETATE MONOME
From USA: Cibatul Ltd., 16,8
kgs., Rs. 2,38,768.

VINYLIDENE FLUORIDE: Fr
USA: Syp Engineering Co
100 kgs., Rs. 22,941.

VINYL RESIN: From USA
J. Shah & Co., 2,250 lbs., R
43,818; C. J. Shah & Co., 2,2
lbs., Rs. 55,503.

XYLENES: From Austra
The Raymond Woollen Mills L
388 ltrs., Rs. 9,130

UD.NE: From Switzerland: r Chem Ltd., 5,000 kgs., 28,220.

XYLIDINE: From Switzer- M. B. Finance Corporation, 2,000 kgs., Rs. 1,30,482; Unity Dye Chem, 600 kgs., Rs. 44,084.

2,6 XYLIDINE: From Switzerland: Mahendra Chemicals, 1,200 kgs., Rs. 1,50,974.

DRUGS.MATERIALS IMPORTED

BOMBAY

From 16.2.88 to 29.2.88)

ALPHA PHENYL GLYCINE ORIDE HYDROCHLORIDE: Netherlands: Ranbaxy Lab- ries Ltd., 12,075 kgs., Rs. 3,031.

MIDOTRIZOIC ACID USP: FRG: German Remedies 2,035.2 kgs., Rs. 13,85,562.

PICILLIN TRIHYDRATE: Netherlands: Ranbaxy Lab- res Ltd., 2,000 kgs., Rs. 9,011.

MPROLIUM HCL: From USA: l Vitamins, 200 kgs., Rs.

TAINE BASE MONOHYDR- From FRG: U.S. Vitamins l Ltd., 840 kgs., Rs. 36.

LCIUM D PANTOTHENA- SP: From Japan: Bombay na Products, 500 kgs., Rs. 7; E. Merck India Ltd., 600 Rs. 1,09,059.

LOROFORM BP: From Unique Pharmaceuticals 16.38 Mts., Rs. 2,13,543.

RIC ACID BP 80: From G. Amohray Laboratories. s., Rs. 5,63,472.

RIC ACID MONOHYDRA- P. From China: Lyka Labora- Pvt. Ltd., 350 kgs., Rs. Kopi Chem Dye., 17.5 Rs. 2,94,235; From China: a Chemical Inds., 20 Mts., 3,36,256; Samir Trading 35 Mts., Rs. 5,88,466

CREATININE: From Australia: Cadila Laboratories Pvt. Ltd., 60 kgs., Rs. 72,379.

ERYTHROMYCIN THIOCYANATE: From Italy: Sumedha Chemicals, 1,337.55 kgs., Rs. 10,67,872.

LACTOSE BP/USP/IP: From Netherlands: Searle (India) Ltd., 5,000 kgs., Rs. 62,404.

L-LYSINE MONO HCL USP: From Japan: N. R. Jet Pharmaceuticals Ltd., 400 kgs., Rs. 25,966.

MANNITOL USP/BP: From Australia: Tata Exports Ltd., 1,000 kgs., Rs. 23,370.

MANNITOL USP PYROGEN FREE: From Brazil: Hindustan Ciba Geigy Ltd., 7,000 kgs., Rs. 1,49,957; Sarabhai Chemicals, 2,000 kgs., Rs. 45,124.

MEGLUMINE BP/USP: From FRG: German Remedies Ltd., 500 kgs., Rs. 1,31,541.

METHYL SALICYLATE BP: From France: Bombay Drug House Ltd., 1,000 kgs., Rs. 40,577.

NALIDIXIC ACID USP: From UK: Win Medicare Ltd., 750 kgs., Rs. 6,43,865.

NOVALDIAMINE: From FRG: IPCA Labs Pvt. Ltd., 1,980 kgs., Rs. 6,25,317.

PANCREATIN IP: From FRG: Hoechst India Ltd., 5,000 kgs., Rs. 23,832.90.

PARACETAMOL BP: From China: Inca Laboratories Pvt. Ltd., 850 kgs., Rs. 73,387.

PENICILLIN G POTASSIUM From UK: Hindustan Antibiotic Ltd., 10,800 kgs., Rs. 27,69,979

PHENOL USP: From Japan Ata Laboratories Pvt. Ltd 50,000 kgs., Rs. 6,16,704; From Japan: S. D. Fine Chem Pvt. Ltd. 16,000 kgs., Rs. 2,97,732.

POLYSORBATE 60: From Switzerland: Parke Davis (India Ltd., 3,000 kgs., Rs. 96,623.

POVIDONE IODINE USP From USA: Wockhardt Ltd., 4,500 kgs., Rs. 3,05,723.

PROPYLENE GLYCOL USP: From Singapore: Lupin Laboratories Pvt. Ltd., 17.2 kgs., Rs. 1,89,817; M. J. Exports Pvt. Ltd., 16.770 Mts., Rs. 1,80,716; Revex Plasticisers P. Ltd., 8,600 kgs., Rs. 94,908; From USA: Mahindra & Mahindra Ltd., 41,925 kgs., Rs. 4,46,345.

PYRAZINAMIDE BP/USP: From Korea: Lupin Laboratories Ltd., 500 kgs., Rs. 2,50,576.

PYRAZINAMIDE: From Korea: Lupin Labs. Pvt. Ltd., 500 kgs., Rs. 2,59,341.

PYRIDOXINE HYDROCHLORIDE USP: From Japan: Bombay Pharma Products, 400 kgs., Rs. 1,86,959.

SODIUM D PANTOTHENATE: From Japan: Parke Davis India Ltd., 250 kgs., Rs. 99,908.

SULPHADIAZINE IP/BP: From China: Pharmpak Pvt. Ltd., 2,000 kgs., Rs. 5,19,330.

TARTARIC ACID BP/USP: From FRG: Cadia Laboratories P. Ltd., 18,000 kgs., Rs. 6,43,018.

THEOPHYLLINE MONOHYDRATE: From USSR: Torrent Exports Pvt. Ltd., 2,000 kgs., Rs. 1,41,060.

VITAMIN B6 USP: From Japan: UNI UCB Ltd., 250 kgs., Rs. 1,19,711.

Plastic Materials Imported

BOMBAY

(From 16.2.88 to 19.2.88)

COPOLYMER OF ETHYLENE AND METHACRYLIC ACID: From USA: BSSEC Packaging Ltd., 268 kgs., Rs. 61,670.

HIGH IMPACT POLYSTYRENE: From Korea: Bright Bros. Ltd., 25 Mts., Rs. 4,70,643.

HDPE : From Czechoslovakia: Associated Bros., 37.5 Mts., Rs. 3,45,699; Associated Plastic Industries, 100 Mts., Rs. 9,21,864; Hardik Indl. Corporation, 75 Mts., Rs. 6,91,398; From Malaysia: Adinath Narrow Fabrics P. Ltd., 17.150 Mts., Rs. 2,31,569; From Saudi Arabia: Maruti Plastic Inds., 51.450 Mts., Rs. 6,27,909; Minocha Button Stores, 17.150 Mts., Rs. 2,10,416; Plastic Processors, 34.30 Mts., Rs. 4,47,552; From Taiwan: Bahar Plastics Ltd., 200 Mts., Rs. 32,76,185; From Yugoslavia: Vee Pee Finance Pvt. Ltd., 100 Mts., Rs. 10,81,012.

HDPE BLOW MOULDING GRADE: From Czechoslovakia: Kalpesh Plastic Inds., 125 Mts., Rs. 11,52,330.

HDPE INJECTION MOULDING GRADE: From Saudi Arabia: Chemofine Corporation, 49.400 Mts., Rs. 5,80,868.

HDPE RESIN GRADE: From Singapore: Giltpack Ltd., 99,000 kgs., Rs. 12,72,488.

LDPE: From Czechoslovakia: Unnati Packaging Inds., 15 Mts., Rs. 1,13,344; From FRG: Finolex Cables Ltd., 49.5 Mts., Rs. 6,10,537; Siemens Ltd., Rs. 49.5 Mts., Rs. 6,10,536; From FRG: Siemens Ltd., 49.5 Mts., Rs. 6,10,536; From Yugoslavia: Pearl Plast International, 25 Mts., Rs. 3,09,241; Ravi International, 60 Mts., Rs. 7,42,800.

LLDPE: From Czechoslovakia: Unnati Packaging Inds., 1.5 Mts., Rs. 1,13,344; From Saudi Arabia: Indian Petrochemicals Corpn. Ltd., 1,287.00 Mts., Rs. 1,85,02,675; Jamnadas Murlidhar Jaisingh, 24.750 Mts., Rs. 3,06,875.

LLDPE RESIN: From USA: Ecoplast P. Ltd., 16 Mts., Rs. 2,13,964.

PHTHALIC PLASTICIZERS: From Korea: Caprihans India Ltd., 48,600 kgs., Rs. 6,77,532.

POLYETHYLENE: From France: Industrial Cables India Ltd., 19.2 Mts., Rs. 3,42,758; From Singapore: Hari Vishnu Packaging Ltd., 33 Mts., Rs. 4,28,447; From Sweden: Vindhya Telelinks Ltd., 202.5 Mts., Rs. 29,89,065.

POLYETHYLENE RESIN: From Canada: Bharat Vijay Mills Ltd., 74.250 Mts., Rs. 8,89,778.

POLYPROPYLENE: From Czechoslovakia: Naresh Paper Bag Co., 14 Mts., Rs. 1,62,208; Valia Impex P. Ltd., 14 Mts., Rs. 1,62,208; From France: Gujarat Propack Ltd., 30,000 kgs., Rs. 13,96,997; From Italy: Caprihans India Ltd., 30 Mts., Rs. 5,21,928; From Singapore: Diamond Polyplast Pvt. Ltd., 16 Mts., Rs. 2,88,747; Richardson Hindustan Ltd., 16 Mts., Rs. 2,92,902; From USA: Creative Plastic Inds., 99.525 Mts., Rs. 12,92,158; Fum Plastic Inds. Ltd., 12.5 Mts., Rs. 2,28,113; Sanghvi Hardware Stores, 20.411 Mts., Rs. 2,91,501.

POLYPROPYLENE FILM GRADE: From Singapore: Fraternity Electronics Ltd., 16,000 kgs., Rs. 2,78,361.

POLYPROPYLENE INJ. GRADE: From USA: Gujarat Plastic Inds., 42.070 kgs., Rs. 4,36,964.

POLYPROPYLENE RESIN : From Korea: Sanghvi Filaments Pvt. Ltd., 3 Mts., Rs. 44,143.

POLYSTYRENE: From Mexico Lucky Plastic, Rs. 1,43,371.

POLYSTYRENE RESIN: Fro Korea: Steriplate Pvt. Ltd. 5 Mts., Rs. 9,53,158.

POLYTETRAFLUOROETHYL ENE: From Japan: Space Application Cables, 1,000 kgs., Rs 1,39,570.

PVC RESIN: From Japan: Phiroze Sethna Pvt. Ltd., 3.5 Mts Rs. 1 01,959; From Mexico: Prakash Pipes & Inds. Ltd., 100 Mts Rs. 12,11,460; From Yugoslavia Ajay Indl. Corporation, 10 00 kgs., Rs. 1,14,560; Jain Bros Industries, 946 Mts., Rs. 1,18 37,905.

PVC RESIN SUSPENSION GRADE: From Romania: Usha Chemical Inds., 100 Mts., Rs. 12. 22,601.

PVC MASS POLYMER GRADE From Yugoslavia: Jain Tube Co Ltd., 325 kgs., Rs. 42,76.426 Premier Vinyl Flooring Ltd., 10 Mts., Rs. 13,14,935.

PVC STABILISERS: From FRG Lightcraft Corporation, 2,86 kgs., Rs. 2,84,300.

BOMBAY

(From 22.2.88 to 29.2.88)

HDPE: From Belgium: Plastic Processors, 84.925 Mts., Rs. 11,28,870; Polyplast Pvt. Ltd. 32.825 Mts., Rs. 4,36,329; From FRG: Jindal Stripes Ltd., 24.75 kgs., Rs. 3,22,942; From Japan. Maniyal Packaging Pvt. Ltd., 33 Mts., Rs. 4,32,730; Raj Kamal Plastics Pvt. Ltd., 32.45 Mts., Rs. 4,87,215; Suresh C. Doshi, 16 Mts., Rs. 1,81,765; From Korea: Calcum Electronics Pvt. Ltd., 1 Mts., Rs. 3,24,451; Hindusta Copper Ltd., 74,250 kgs., Rs 9,68,826; From Saudi Arabia Jaisingh Packaging. 102.90 Mts., Rs. 13,35,976; J. K. Sayani Enterprises, 49.5 Mts., Rs

7; Khetan Packaging Pvt.
.5 Mts., Rs. 2,64,008;
Plastics, 17.150 Mts., Rs.
3; Prince Marketing,
Mts., Rs. 6,71,328; Re-
astics, 34.65 Mts., Rs.
77; Texplast Engg. Pvt.
3,000 kgs., Rs. 4,32,731;
t, 24.750 Mts., Rs. 3,22,-
rom Singapore: Hari Vish-
kaging Ltd., 49.5 Mts., Rs.
71; PVD Plast Mould Inds.
4,750 kgs., Rs. 3,22,942;
xim P. Ltd., 99 Mts., Rs.
924; From Taiwan: Jag-
rasad Jain, 24,750 kgs.,
2,942; From USA: Darshit
ses, 105 Mts., Rs. 10,-
; From Yugoslavia: Lucky
, 48 Mts., Rs. 5,14,101;
Suppliers, 131 Mts., Rs.
56.

E INJ. MOULDING GRA-
m USA: United Brothers,
s., Rs. 10,22,430.

E MOULDING POWDER:
audi Arabia: Hindustan
Glass Ltd., 17.150 kgs.,
4,889.

E RESIN: From Canada:
Vijay Mills Ltd., 49.5 Mts,
3,185; From Korea: Hin-
Copper Ltd., 1,48,500

: From Brazil: Ansat Plas-
Ltd., 150 kgs., Rs. 18,-
Indian Petrochemicals
td. 2,550 Mts., Rs. 3,14,-
From FRG: Industrial
pn., 20 Mts., Rs. 2,13,-
an Inds., 21.5 Mts., Rs.
2; Ravindra Plastic Inds.,
Rs. 3,20,556; Vipul En-
, 30 Mts., Rs. 3,20,556;
tar: Indian Petrochemi-
pn., 594 Mts., Rs. 86,-
From Singapore: V. K.
ing Plastic Inds., 16.5
. 2,42,073; From UK:
etroleum Corpn. Ltd., 17
2,33,958; From Yugos
ian Polymers Pvt. Ltd.,

100 Mts., Rs. 10,91,464; Ravi International, 40,000 kgs., Rs. 4,95,200; From Yugoslavia: Ravi International, 40,000 kgs., Rs. 4,95,200.

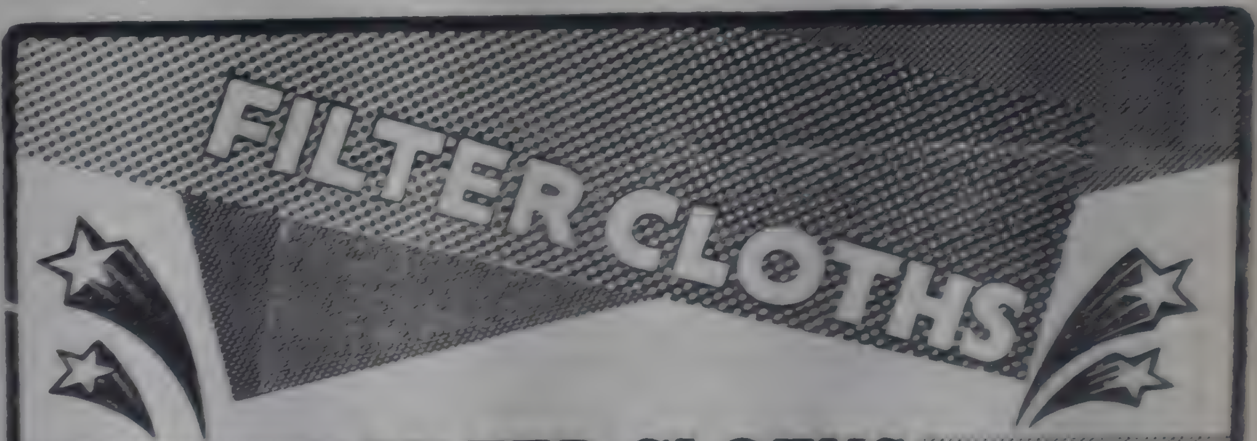
LDPE MOULDING POWDER: From FRG: Milan Industries, 30 Mts., Rs. 3,20,556; Suvin Co-extrusions Pvt. Ltd., 50 Mts., Rs. 5,34,260.

POLYACETAL MOULDING POWDER: From Japan: Peico Electronics & Elect. Ltd., 2,000 kgs., Rs. 57,126.

POLYACRYLIC ACID: From USA: PDI Chemicals Pvt. Ltd., 2,400 lbs., Rs. 62,320.

POLYETHYLENE MOULDING POWDER: From FRG: Albert David Ltd., 15 Mts., Rs. 2,50,551.

POLYPROPYLENE: From Australia: Beijaj Plastics Ltd., 191.875 Mts., Rs. 33,07,483; From Belgium: Kanpur Plastipack Ltd., 139.3 Mts., Rs. 24,65,758; From Czechoslovakia: Associated Plastic Inds., 14 Mts., Rs. 1,62,208; From France: Rajasthan Petro Synthetics Ltd., 1,500 kgs., Rs. 3,28,219; Rajasthan Petro synthetics Ltd., 1,500 kgs., Rs. 3,28,219; Arjun Impex, 41.16 Mts., Rs. 2,88,747; From FRG: Gujarat Propack Ltd., 500 kgs., Rs. 30,280; New Plastomers India Ltd., 14 Mts., Rs. 2,40,464. From Italy: Furt Plastic Inds. Ltd. 30 Mts., Rs. 5,21,926; Joshi Formulabs P. Ltd., 15,000 kgs., Rs. 2,43,436; Mutual Steel Inds., 30 Mts., Rs. 5,21,926; Tepack Inds., 15,000 kgs., Rs. 2,47,131; From Netherlands: Cosmo Films Ltd., 64,000 kgs., Rs. 11,46,479; Garware Wali Ropes Ltd., 1,28,000



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kgs., Rs. 21,66,161; From Singapore: Noval Products, 16,000 kgs., Rs. 2,84,593; From UK: Qadri Commercial Corpn., 15,000 kgs., Rs. 2,37,595; From USSR: Patin Bros. Pvt. Ltd., 16 Mts., Rs. 2,88,747; From Yugoslavia: Eagle Flasks Pvt. Ltd., 496 Mts., Rs. 89,54,188.

POLYPROPYLENE RESIN: From Bulgaria: Nidhi Plastics P. Ltd., 196.45 Mts., Rs. 34,17,866.

POLYSTYRENE: From Korea: A. K. Structural Foam Ltd., 8,000 kgs., Rs. 1,92,152.

POLYSTYRENE MOULDING POWDER: From Korea: Dilip Industries, 17 Mts., Rs. 3,11,208.

POLYSTYRENE: From Korea: Sargodha Enterprises, 17 Mts., Rs. 3,20,037; From Mexico: Hemant Plastic Inds., 2,000 Mts., Rs. 12,08,640; Seth Plastic Bhandar, 52.5 Mts., Rs. 9,06,480; Verma Extrusions Pvt. Ltd., 10 Mts., Rs. 1,43,371.

PROPYLENE GLYCOL: From USA: Unit and Industries, 10.105 Mts., Rs. 1,06,269.

PTFE: From Japan: Jayems Technical Associates, 1,000 kgs., Rs. 1,13,603.

PTFE RESIN: From Australia: Nalin India Ltd., 1,200 kgs., Rs. 1,71,379; From FRG: Garg Associates Pvt. Ltd., 4,000 kgs., Rs. 5,45,296; From Italy: Hindustan Ferrodo Ltd., 780 kgs., Rs. 1,06,333; From Japan: Asheston Packing & Mfg. Co. Pvt. Ltd., 500 kgs., Rs. 64,917; Fluoropolymer Products Inds., 2,300 kgs., Rs. 3,33,734; Sealwell Inds., 550 kgs., Rs. 67,578; From Brazil: Bhagirath Agro Plast P. Ltd., 50 Mts., Rs. 6,46,005; Novilex Plastic Pvt. Ltd., 100 Mts., Rs. 12,92,354; Trimurti Foods & Ph
Pvt. Ltd., 50 Mts., Rs. 6,46

PVC RESIN: From Korea: H
Leather Cloth Mfg. Co. P
30 Mts., Rs. 4,56,505; Hin
tan Copper Ltd., 100 Mts.,
12,92,353; Mohan Overseas
Ltd., 75 Mts., Rs. 10,36,045
National Leather Cloth Mfg
Mts., Rs. 12,01,558; From M
co: Ashish Industries 201
Rs. 27,21,948; Prakash Pipe
Inds. Ltd., 100 Mts., Rs. 12
460; From Poland: Gwalior P
pipes Ltd., 247.5 Mts., Rs
33,126; From Saudi Arabia:
nish Vinyals 50 Mts., Rs. 7
029; Varsha Agro Plast Pvt.
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Turkey: Vinyl Products
Mts., Rs. 27,85,571; From
cslavia: Accurate Pipes &
tics Pvt. Ltd., 25 Mts., Rs. 3
034; Garware Plastics &
ester Ltd., 800 Mts., Rs. 1
80,197; Marvel Vinyl Pvt.
50 Mts., Rs. 6,62,068; Ori
Extrusions Pvt. Ltd., 175
Rs. 23,12,824; Polycab Inds
Mts., Rs. 3,31,034.

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GRADE: From France: In
Plastic Bhandar, 44.87 Mts.,
5,70,337; From Japan: Godh
ri Brothers India Pvt. Ltd.
Mts., Rs. 3,53,466; From Ko
The Bhor Inds. Ltd., 200 M
Rs. 28,17,344; Jain Tube
Ltd., 100 Mts., Rs. 13,05
From Taiwan: P. Hira, 25 M
Rs. 3,53,466; From Turkey: G
lior Polypipes Ltd., 749.625 M
Rs. 18,48,872; Premier V
Flooring Ltd., 75,375 Mts.
9,34,009; Uniplast India
100.125 Mts., Rs. 12,46
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